
Chapter 5—ISDN BRI line and packet data implementation

Introduction

This chapter describes Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI) line and packet data implementation. Hardware requirements, installation procedures and software programming procedures for the Option 11 system are described.

This chapter is divided into the following sections:

- ISDN BRI Line configuration
- guidelines
- ISDN BRI terminals
- Packet Data configuration
- Hardware requirements
- Installing ISDN BRI hardware
- Programming procedures for line application and packet data transmission

ISDN BRI line configuration guidelines

The following recommendations should be considered when connecting terminals to DSLs:

- The total number of physical terminations on an S/T DSL may not exceed eight. Up to 20 logical terminals may be connected to an S/T DSL. A logical terminal may be directly connected to the DSL through its own physical termination, or it may be indirectly connected through a common physical termination.

For non-blocking traffic conditions: Two B-channel circuit-switched voice or data terminals may be connected on each S/T DSL. More than two B-channel terminals may be connected, however, only two will be able to communicate simultaneously. If more than two terminals are connected this could create a blocking condition where the terminals will contend for available B-channels. Any other terminals connected to this DSL can only be D-channel terminals. You can install more than one D-channel terminal if their combined packet data transmission speeds do not exceed the D-channel throughput of 16 kbps.

For blocking traffic conditions: If you accept blocking traffic conditions on DSLs, you can install any combination of B-channel and D-channel terminals as long as the total number of physical terminations connecting these terminals to the DSL does not exceed eight. These physical terminations may link up to 20 logical terminals. The greater the number of terminals on a DSL, the greater the traffic blocking.

- Only one termination may be connected at the end of a UILC DSL. This termination may be to a Network Termination (NT1) or directly to a single U interface terminal. Normally this physical termination is to an NT1, (that supports 2B1Q line encoding) which provides an S/T interface that allows up to 8 physical terminals to be connected. These terminals communicate to the Option 11 through the NT1 and the UILC interface.
- Determine the type of DSL you wish to use to connect your terminals keeping in mind the wire type, the length, and the layout of your office wiring.

DSL configuration

Digital subscriber loops connect the Option 11 to ISDN BRI terminals. A DSL consists of a cable connecting the ISDN BRI port to the cross-connect terminal. From there, the loop is cross-connected to the office wiring, which terminates into 8-pin modular jacks (typically wall outlets). From these outlets, module cables of a maximum length of 10 m (33 ft) connect to ISDN BRI terminals.

The DSLs should be engineered with the following basic considerations in mind:

- loop length
- cable type and wire gauge
- distribution of terminals on a DSL
- type of terminals connected to a DSL

SILC DSL configuration

The SILC supports both point-to-point and point-to-multipoint transmission. The maximum DSL length must not exceed 1 km (3,280 ft); however, the actual length depends on the cable wire gauge, the number of terminals connected to the loop, and the differential round-trip time delay limits.

When you are configuring DSLs, follow these basic rules:

- maintain wiring polarity for both the transmit and receive pairs
- use a maximum of 10 m (33 ft) modular cable to connect each ISDN BRI terminal to the DSL
- keep the length of the cable stub (distance between the RJ-45 receptacle and the DSL cable) to less than 1 m (3.3 ft)
- don't allow bridge taps or split pairs on the DSL and make sure that the differential pairs (Tx-/Tx+ and Rx-/Rx+), each consist of a twisted pair along the entire length of the DSL
- make sure ISDN BRI terminals powered through the DSL do not exceed the total power of 2 Watts (see *Line powering* in this chapter)

- connect a maximum of two ISDN BRI terminals requiring B-channel transmission or one terminal using both circuit-switched voice and data to each DSL for a non-blocking configuration
- select the appropriate number of D-channel terminals based on the transmission speed of each terminal on the DSL
- select the appropriate timing mode when you configure the DSL using Service Change BRI Program LD 27
- place the terminating resistor box (A0378866) at the end of the loop, refer to Figure 13.

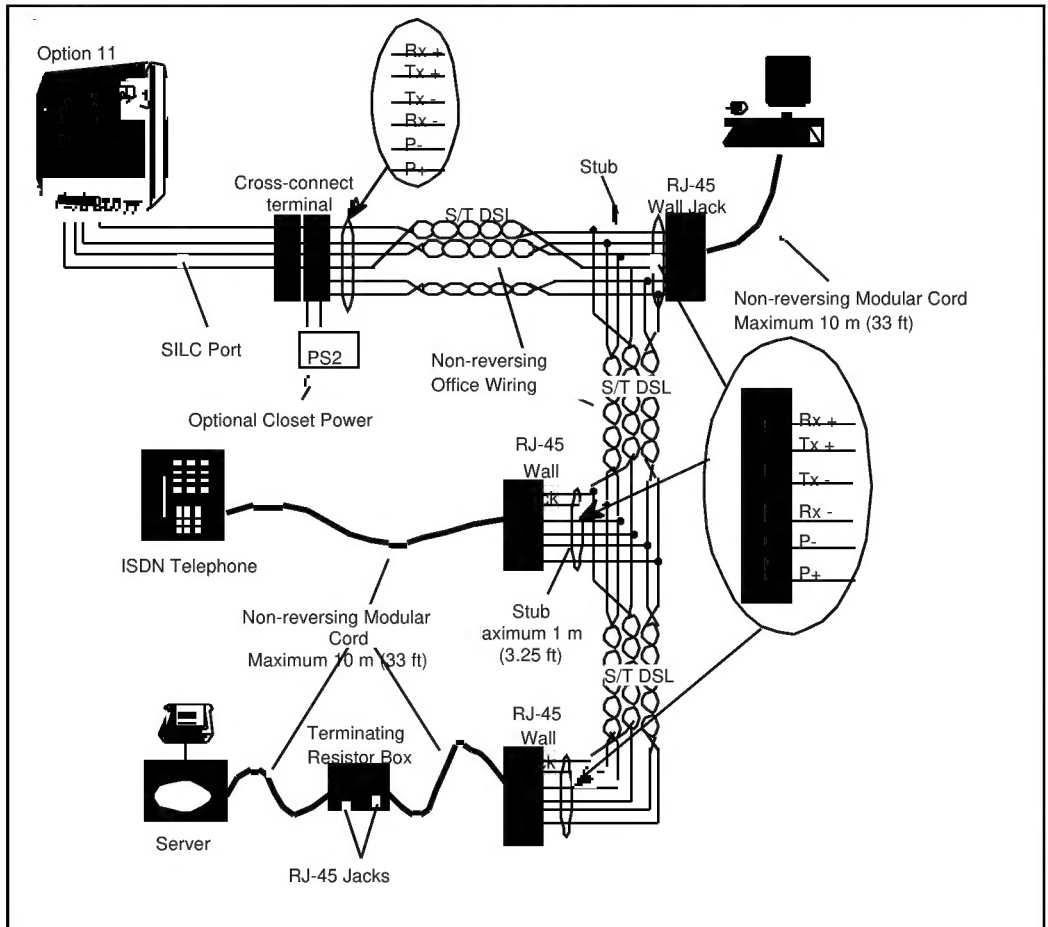
Line powering options

Figure 13 shows a wiring example of a SILC DSL with multiple physical terminations and the terminating resistor at the end of the loop. a SILC DSL consists of a six-wire twisted pair cable, but only four wires carry the signal and two wires provide conduit for an auxiliary power source. This external power source can be used when the total power consumption exceeds 2 Watts on each DSL. In this case the terminals need to be configured to use the auxiliary power source (PS2) or other auxiliary power supplies as part of their product packages.

Note: An AC/DC adapter is available for the Northern Telecom M5317DX ISDN BRI telephone set. This is used when a closet optional power supply is not available and the set is not powered from the DSL. Power

When power is supplied from the S/T interface, the terminal devices must not draw more than 2 Watts of power. With this arrangement, power to the terminal devices on the DSL is not interrupted during commercial power failures if the Option 11 system is equipped with batteries.

Figure 13
S/T digital subscriber loop wiring example for ISDN BRI lines



Cable characteristics

Table 5 lists the parameters of the various cable types used in determining the S/T DSL configuration limits. The cables listed are those used for telephony wiring applications, and the characteristics listed are for Northern Telecom cable at 96 kHz and 20° C (68° F).

Table 5
Cable types and characteristics

Cable type	Gauge AWG	Loss dB/k ft (dB/km)	Delay μs/k ft (μs/km)
Outside PIC	22	1.6 (5.4)	1.7 (5.5)
Outside PULP	22	1.8 (6.0)	1.6 (5.3)
Outside PIC	24	2.3 (7.6)	1.7 (5.6)
Outside PULP	24	2.5 (8.2)	1.7 (5.5)
Outside PIC	26	3.3 (11.0)	1.8 (5.9)
Outside PULP	26	3.3 (11.0)	1.7 (5.7)
Inside riser	22	1.6 (5.2)	1.6 (5.2)
Inside riser	24	2.3 (7.5)	1.7 (5.6)
Inside riser	26	3.2 (10.5)	1.8 (5.9)
Inside Z station (FT1)	22	1.6 (5.2)	1.8 (5.9)
Inside Z station (FT4)	22	2.0 (6.6)	2.0 (6.6)
Inside type D (3 and 4 pair)	24	2.6 (8.5)	1.9 (6.2)
Inside type D (25 pair)	24	2.9 (9.5)	2.0 (6.6)

The following examples show some typical SILC DSL configurations. These are:

- point-to-point DSL
- short passive DSL
- extended passive DSL
- branched passive DSL

Point-to-point SILC DSL

This configuration is shown in Figure 14. It represents the simplest type of bus configuration. The Point-to-Point bus provides the longest DSL length.

Recommended rules:

- Configure the DSL as adaptive mode through overlay 27 (MODE = NTAS).
- Use a terminating resistor (A0378866) at the end of the DSL.
- Connect only one TE.
- Cable loss must not exceed 6 dB.

Maximum DSL length depends on the cable type and wire gauge. For a point-to-point bus, the DSL length is as shown in Table 6.

Figure 14
Point-to-Point SILC DSL

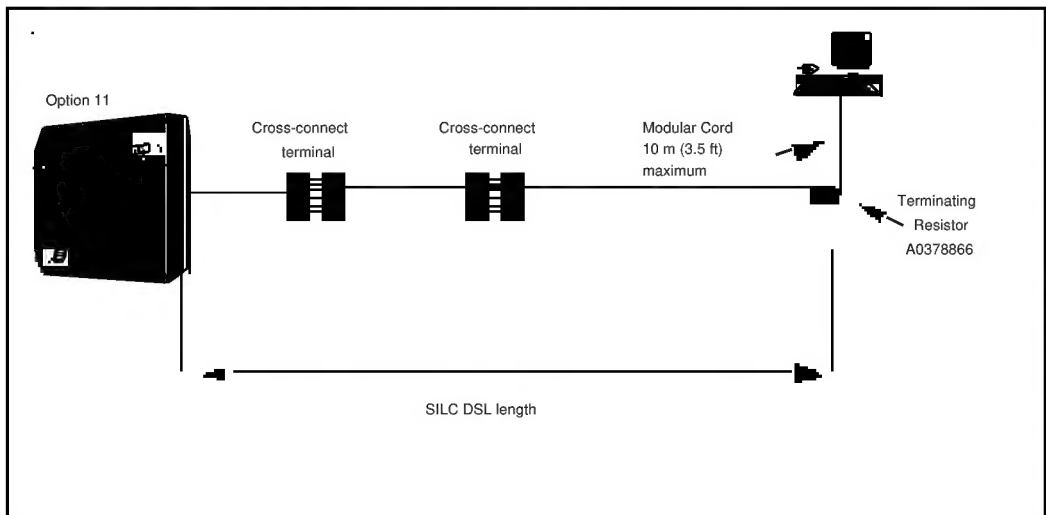


Table 6
Cable types and point-to-point SILC DSL lengths

Cable type	Gauge AWG	Maximum DSL length ft (m)
Outside PIC	22	3640 (1110)
Outside PIC	24	2590 (790)
Outside PIC	26	1770 (540)
Outside PULP	22	3280 (1000)
Outside PULP	24	2390 (730)
Outside PULP	26	1770 (540)
Inside riser	22	3770 (1150)
Inside riser	24	2620 (800)
Inside riser	26	1870 (570)
Inside Z station (FT1)	22	3770 (1150)
Inside Z station (FT4)	22	2980 (910)
Inside type D (3 and 4 pair)	24	2300 (700)
Inside type D (25 pair)	24	2070 (630)

Short passive SILC DSL

This configuration is shown in Figure 15. In the short passive DSL configuration the NT and terminals may be located anywhere along the DSL. This configuration has the shortest length, but the maximum number of terminals are allowed with no restrictions on the location of the Option 11 (Meridian 1) and the terminals.

Recommended rules:

- Configure the DSL as fixed timing mode through overlay 27 (MODE = NTFS).
- A maximum of eight terminals may be connected.
- Use a 100 $\frac{3}{4}$ terminating resistor (A0378866) at the end of the DSL.
- Terminate both ends of the DSL if the NT is not located at the end of the DSL. In this case the distance between the Meridian 1 and the DSL should not exceed 30 ft (9 m).
- The maximum round trip delay for the selected DSL cable is 2 μ s.

Maximum DSL length depends on the cable type and wire gauge. For a short passive DSL, the length is as shown in Table 7.

Figure 15
Short passive SILC DSL

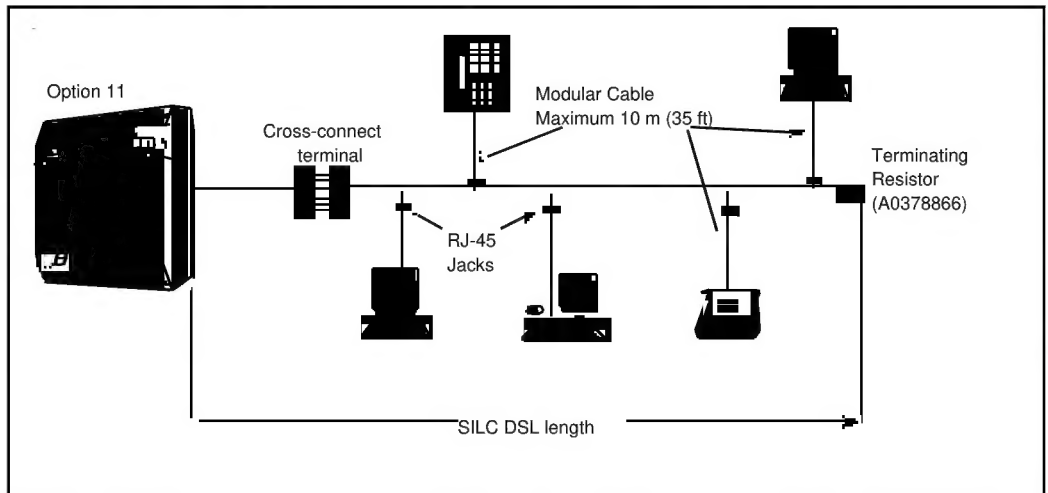


Table 7
Cable types and short passive SILC DSL lengths

Cable type	Gauge AWG	Maximum DSL length ft (m)
Outside PIC	22	560 (170)
Outside PIC	24	540 (165)
Outside PIC	26	510 (155)
Outside PULP	22	560 (170)
Outside PULP	24	560 (170)
Outside PULP	26	520 (160)
Inside riser	22	590 (180)
Inside riser	24	540 (165)
Inside riser	26	490 (150)
Inside Z station (FT1)	22	490 (150)
Inside Z station (FT4)	22	460 (140)
Inside type D (3 and 4 pair)	24	490 (150)
Inside type D (25 pair)	24	480 (145)

Extended passive SILC DSL

This bus configuration is shown in Figure 16. The extended passive bus is designed to allow up to four terminals to be located a long distance from the SILC. The length of the DSL and the separation between each terminal are the significant factors in this configuration.

Recommended rules:

- Configure the DSL in adaptive mode through overlay 27 (MODE = NTAS).
- Use a 100 $\frac{3}{4}$ terminating resistor (A0378866) at the end of the DSL.
- Configure no more than four terminals.
- The cable loss must not exceed 3.8 dB.

The maximum DSL length and separation between terminals is given in Table 8. Configure the first terminal at the end of the terminated DSL, then calculate the distance from the farthest to the nearest terminal. For every terminal (less than four) not configured, you may add 15 ft (5 m) to the distance of total terminal separation.

Figure 16
Extended passive SILC DSL

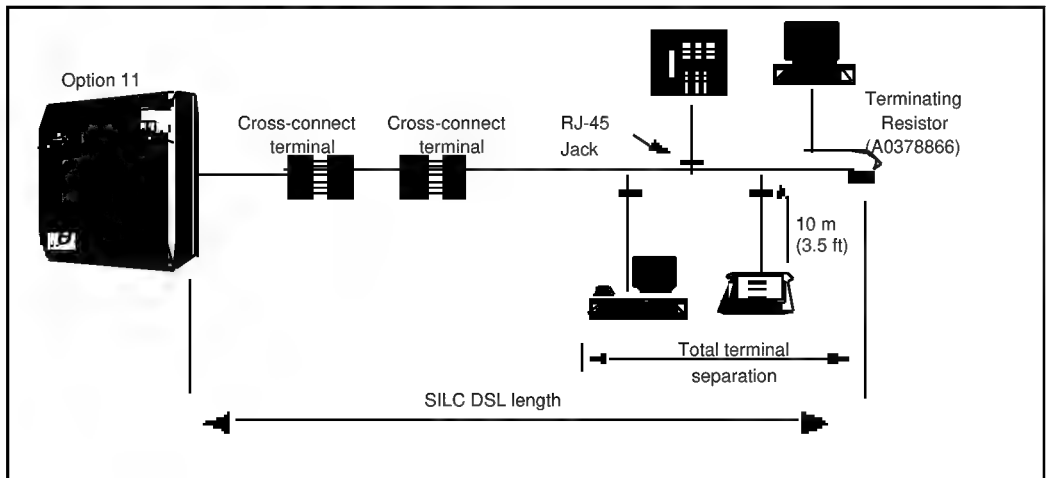


Table 8
Cable types and extended passive SILC DSL lengths

Cable type	Gauge AWG	Maximum DSL length ft (m)	Total terminal separation ft (m)
Outside PIC	22	2300 (700)	130 (40)
Outside PIC	24	1640 (500)	130 (40)
Outside PIC	26	1110 (340)	120 (36)
Outside PULP	22	2070 (630)	140 (42)
Outside PULP	24	1510 (460)	130 (40)
Outside PULP	26	1110 (340)	120 (36)
Inside riser	22	2390 (730)	140 (42)
Inside riser	24	1640 (500)	125 (38)
Inside riser	26	1180 (360)	115 (35)
Inside Z station (FT1)	22	2390 (730)	115 (35)
Inside Z station (FT4)	22	1870 (570)	110 (33)
Inside type D (3 and 4 pair)	24	1443 (440)	115 (35)
Inside type D (25 pair)	24	1310 (400)	115 (35)

Branched passive SILC DSL

This bus configuration is shown in Figure 17. The branched passive bus configuration uses the existing building wiring where the DSL is terminated in a telephone wiring closet. The significant factors in this configuration are the maximum DSL length, and the total length of the two branches.

Recommended rules:

- Configure the DSL as adaptive mode through overlay 27 (MODE = NTAS).
- Configure no more than four terminals.
- Configure no more than two terminals per branch.
- Use a 100 $\frac{3}{4}$ terminating resistor at the end of the DSL.
- The cable loss must not exceed 3.8 dB.

Figure 17
Branched passive SILC DSL

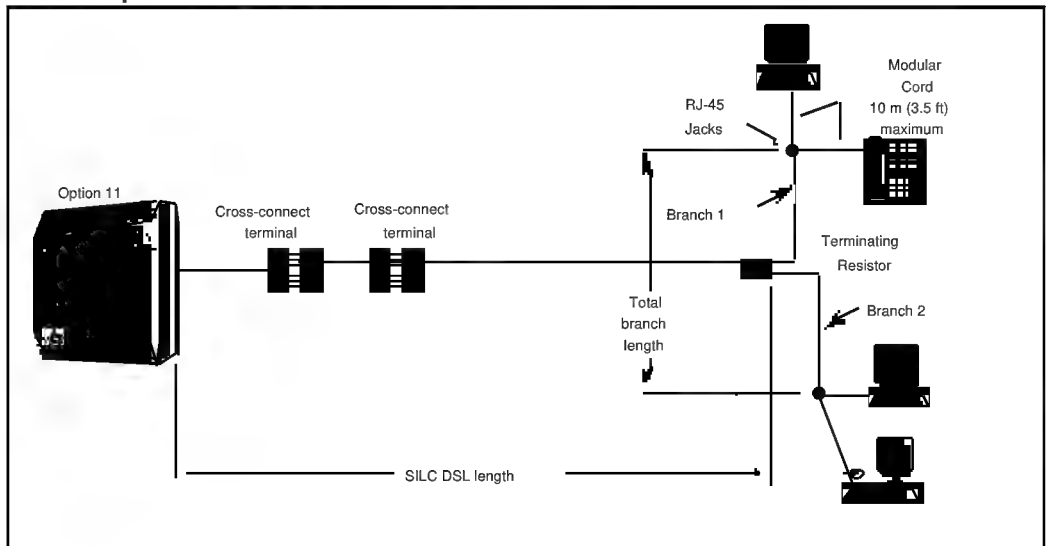


Table 9 shows the recommended maximum length of cable and branches at the end of the DSL. Calculate the length of the DSL, and the sum of the branches. Refer to Table 9 for maximum allowable limits.

Maximum SILC DSL length depends on the cable type and wire gauge. For a branched passive bus, the DSL length is typically:

- 585 m (1,919 ft) for Inside Z station type cable 22 AWG
- 365 m (1,197 ft) for Inside type D cable 24 AWG
- 315 m (1,033 ft) for Inside riser type cable 26 AWG

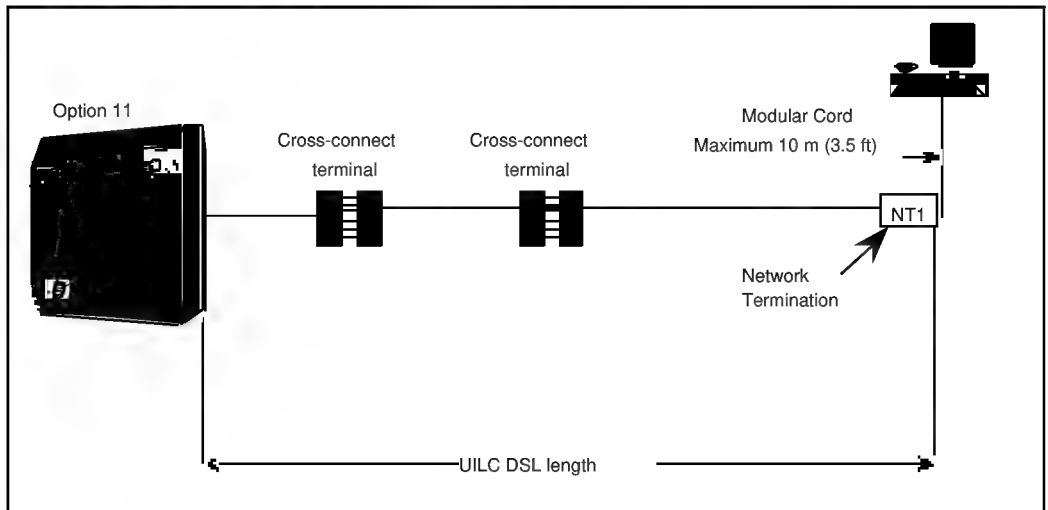
Table 9
Cable types and branched passive SILC DSL lengths

Cable type	Gauge AWG	Maximum DSL length ft (m)	Maximum total branch lengths ft (m)
Outside PIC	22	1115 (340)	345 (105)
Outside PIC	24	885 (270)	345 (105)
Outside PIC	26	705 (215)	330 (100)
Outside PULP	22	1030 (315)	360 (110)
Outside PULP	24	835 (255)	345 (105)
Outside PULP	26	705 (215)	310 (95)
Inside riser	22	1150 (350)	360 (110)
Inside riser	24	885 (270)	345 (105)
Inside riser	26	720 (220)	330 (100)
Inside Z station (FT1)	22	1150 (350)	330 (100)
Inside Z station (FT4)	22	965 (295)	310 (95)
Inside type D (3 and 4 pair)	24	820 (250)	330 (100)
Inside type D (25 pair)	24	235 (770)	310 (95)

UILC DSL configuration

The UILC supports only point-to-point transmission. The maximum DSL length should not exceed 5 km (16,404 ft). Figure 18 shows a typical U interface DSL with an NT1 terminating the DSL and providing an S/T interface to an ISDN BRI terminal.

Figure 18
Point-to-Point UILC DSL



This interface is designed to use most of the existing non-loaded twisted pair wiring in North America. Not all the twisted pair cables are suitable for ISDN BRI application. Before you use a section of this cable for Basic Rate Access, you must verify its suitability by performing the following tests:

- determine the type and length of the cable and total signal loss of the DSL
- determine total signal loss contributed by the bridge taps on the DSL
- verify that there are no consistent or random noise sources that may affect the transmission quality
- verify that the cable impedance is as expected, which indicates that there are no bridge taps, no wet cable, and no split pairs, or other damage.
- determine the outlet pinout at the terminal location

The maximum length of the U DSL is determined by maximum loop loss. The maximum loss is 46 dB at 40 kH. However, to meet bit error rate performance of 10^{-7} or better in all cases, a maximum limit of 40 dB cable loss is recommended. Table 10 lists the maximum recommended loop length that should be considered in U-interface DSL installations without any bridge taps.

Table 10
Maximum recommended U DSL length

Cable gauge AWG	Maximum recommended length kft (km)
26	14.5 (4.40)
24	21.5 (6.55)
22	29.0 (8.80)
mix	18.0 (5.50)

Table 11 is recommended as a guideline for calculating selected ISDN U-DSL loss. Use the **Length km (kft)** and **Loss dB** columns to record your calculations. Select the corresponding loss (dB/kft) based on the type of cable used and multiply by the cable length. After calculating all the losses due to the DSL used, calculate losses due to bridge taps. For any bridge tap with length exceeding 3 kft, only add 5.1 dB. Add all the losses due to the DSL and due to bridge taps. The total loss should not exceed the recommended maximum loss of 40 dB.

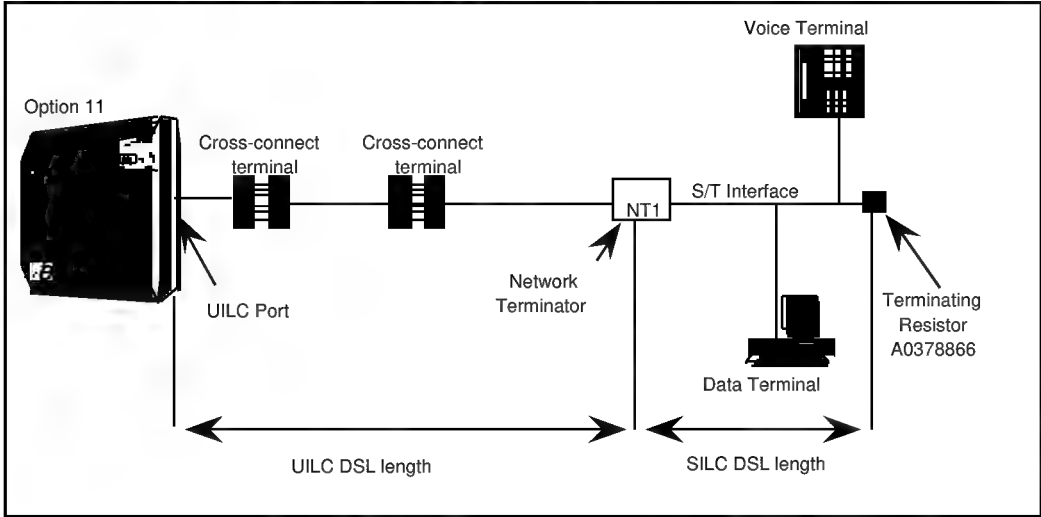
Note: The bridge taps are not terminated and are left unused. A complete knowledge about the characteristics of the DSL selected is recommended. Keep the DSL as simple and as short as possible to obtain maximum performance.

Table 11
U DSL cable calculations

Item	Gauge AWG	Insulation type	Loss dB/km (dB/kft)	Length km (kft)	Loss dB
1	19	PIC	3.3 (1.0)		
2	19	PULP	3.6 (1.1)		
3	22	PIC	4.6 (1.4)		
4	22	PIC	4.9 (1.5)		
5	24	PIC	5.9 (1.8)		
6	24	PULP	6.3 (1.9)		
7	26	PIC or PULP	9.2 (2.8)		
8	Customer premises wiring		5.9 (1.8)		
9	Local exchange wiring		9.2 (2.8)		
10	Bridge tap 1				
11	Bridge tap 2				
12	Bridge tap 3				
13	Bridge tap 4				
14	Bridge tap 5				
15	Bridge tap 6				
Total loss in dB (add items 1 through 15)					
Recommended maximum loss = 40 dB					

Figure 19 shows a DSL extension where the U interface is used to extend the loop by 5 km to an NT1 and from the NT1 it shows an S/T interface connecting two ISDN BRI terminals.

Figure 19
 UICL DSL used as an extension for an S/T interface loop



ISDN BRI terminals

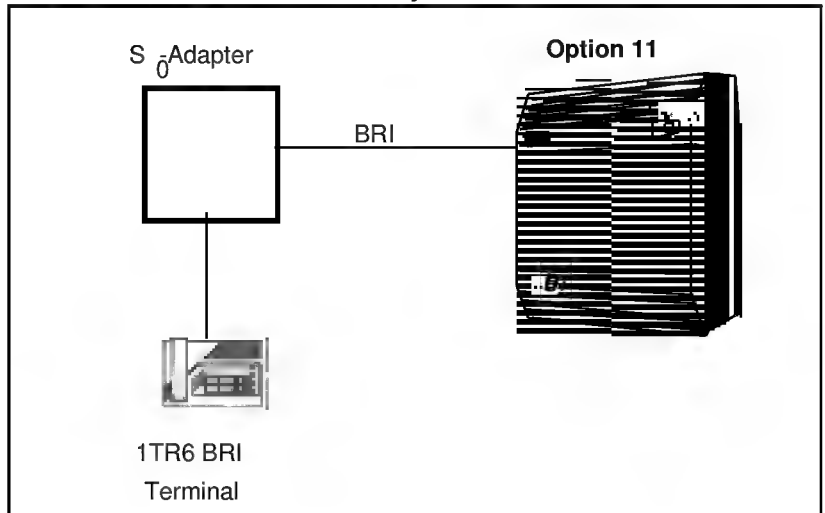
ISDN BRI terminals deemed compatible with the Option 11 system should comply with ANSI, ETSI NET-3, INS NET-64 or Numeris standards for ISDN BRI terminals. 1TR6 terminals are also supported through a 1TR6 to ETSI NET-3 converter box. The list of terminals deemed compatible may change without notice. To obtain the latest list of compatible terminals, contact your Northern Telecom representative.

1TR6 terminal connectivity

1TR6 is the ISDN protocol used in Germany and in any country that supports German protocol.

A Terminal Adapter (the S₀-Adapter) has been specifically designed to interface with Option 11 ISDN BRI and 1TR6 terminals. Its main function is to convert 1TR6 protocol, sent from the 1TR6 ISDN Terminal Equipment, into the European Telecommunication Standard Institute (ETSI) protocol required for ISDN BRI, and vice versa. This conversion is necessary because the layer 3 requirements for 1TR6 and ETSI are different. Figure 20 shows a 1TR6 ISDN BRI terminal connected to a 1TR6 terminal adapter (the S₀-adapter), which is used to access the Option 11.

Figure 20
ISDN BRI/1TR6 terminal connectivity



Terminal addressing and service profile assignment

ISDN BRI terminal addressing and Terminal Service Profile (TSP) assignment differs from the conventional approach where a Terminal Number (TN) identifies a terminal and its address and the protected line blocks in the database contain service related data for that terminal.

Terminal Service Profiles (TSPs) are service profile specifications stored in the database that can be associated with various terminals during terminal initialization and that define the terminal DN, class of service, call restriction levels, and other service and feature attributes. ISDN terminal initialization occurs when a terminal is installed, every time the system is initialized, or when the MISP or the line card the terminal is connected to is replaced.

ISDN BRI terminal addressing

An ISDN BRI terminal connected to a DSL is addressed by using both the physical address and the logical address, where:

- the physical address is **c, dsl#**, representing the *physical* (layer 1) identifier
- the logical address is defined as Terminal Endpoint Identifier (TEI), which is a *data link* (layer 2) identifier and the Terminal Service Profile (TSP), which is a *network* (layer 3) identifier

The Terminal Service Profile (TSP) is represented by the combination of the User Service Identifier (USID) and the Terminal Identifier (TID). The USID uniquely identifies the TSP assigned to one or more terminals on a DSL. Up to 16 TSPs can be configured per DSL.

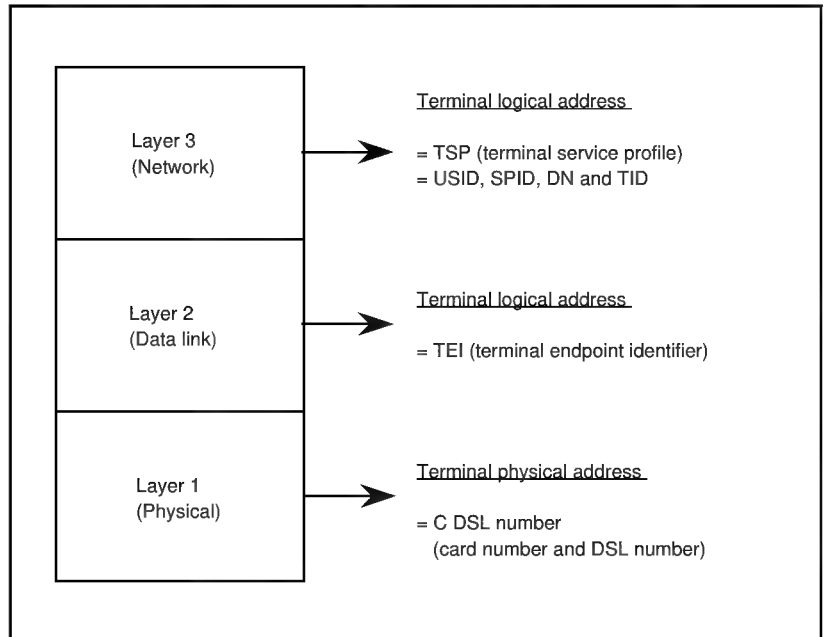
USID is entered in overlay 27, and is entered on the terminal keypad during initialization.

The SPID is an identification number (any combination of 1-20 alphanumeric characters) that is configured in the TSP in overlay 27 and is usually the DN with one or two numeric or alphanumeric (depending on the type of terminal) characters appended to it.

The TID identifies a specific terminal on a DSL using that TSP. All the terminals on a DSL that share the same TSP will have the same USID and a unique TID. TID is an internally assigned parameter that is transparent to the user.

Figure 21 shows the relationships of the physical and logical address components to the OSI model.

Figure 21
Physical and logical address 5-components



Assigning the Terminal Endpoint Identifier (TEI)

A TEI is associated with establishing the *data link* (layer 2) connection between a terminal and the network. The TEI is a terminal logical address that is used by the MISP to address a terminal during the exchange of layer 2 information messages with that terminal. Each logical terminal is associated with one unique TEI. Up to 20 TEIs can be assigned to the logical terminals on one DSL.

Option 11 provides two types of TEIs based on their assignment method. These are:

- dynamic TEI, automatically assigned by the MISP
- static TEI, entered into the terminal by the user on the terminal key pad.

Dynamic TEI

Terminals supporting the automatic endpoint identification procedure receive their TEI automatically when the terminal is connected to the DSL. The MISP detects the terminal on the loop and assigns to it an unassigned TEI. The range of the automatically assignable TEI numbers is from 64 to 126. TEI 127 is used for sending broadcast messages. A different TEI may be dynamically assigned to a terminal every time it is initialized by the system.

Static TEI

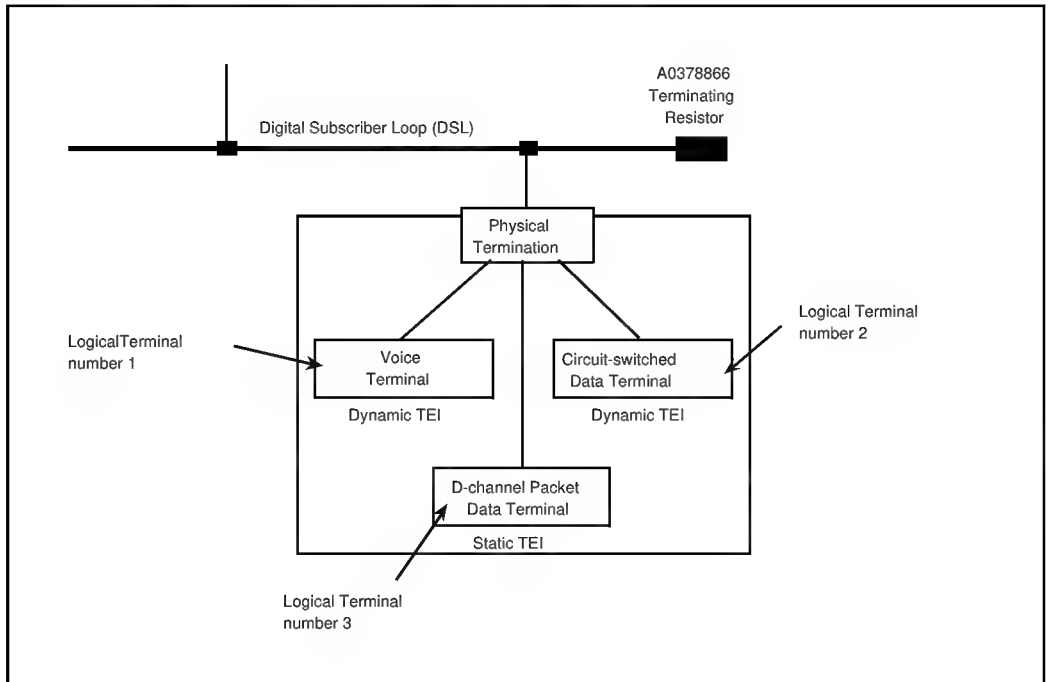
The terminals that do not support dynamic TEI assignment use static TEI assignment. The TEI can be uniquely identified at the data link layer (Layer 2). It can be assigned to one logical terminal at a time, that is, there is a one-to-one mapping of TEI to logical terminal.

The static TEI assignment is performed by entering an unassigned TEI number from 0 to 63 directly into the terminal. This TEI is assigned to that terminal as long as the terminal is operational.

Packet data terminals must use static TEIs.

Figure 22 illustrates how a single physical termination may actually connect multiple logical terminals. Each S/T DSL can support up to eight physical terminations and up to 20 logical terminals. Each logical terminal is assigned one unique TEI, which represents the layer 2 logical address for that terminal.

Figure 22
Multiple logical terminals on one physical termination



Types of ISDN BRI terminals

ISDN BRI terminals are divided into four categories based on layer 3 and layer 2 initialization procedures:

- initializing terminal with dynamic end-point identification
- initializing terminal with static end-point identification
- non-initializing terminal with dynamic TEI assignment
- non-initializing terminal with static TEI assignment

Initializing terminal with dynamic end-point identification

Each initializing terminal has an identification number called a Service Profile ID (SPID) that is entered into the terminal by the user when the terminal is installed. This number is usually the directory number with one or two alphanumeric characters appended to it, although it can be any numeric or alphanumeric (depending on the type of terminal) number up to nine digits long. The M5317TDX terminal is an example of a terminal with dynamic endpoint identification. The SPID is used by the MISP to identify the terminal and to assign to it specific service attributes during layer 3 initialization.

Before layer 3 terminal initialization can start, layer 2 must be fully established, which includes TEI assignment. The TEI may be Dynamic (the MISP assigns an unassigned TEI) or Static (the TEI is manually entered on the terminal key pad). The terminal must then have its SPID number entered at the terminal key pad.

Layer 3 initialization with dynamic endpoint identification starts when the terminal transmits its SPID to the MISP using an information message. The MISP acknowledges the message and sends an endpoint identifier message that contains two identification parameters; the User Service Identifier (USID) and the Terminal Identifier (TID).

Initializing terminal without dynamic endpoint identification

For an initializing terminal that does not support the dynamic end-point identification the end-point identification parameters USID and TID are not automatically assigned by the MISP.

Before layer 3 terminal initialization can start, the terminal must have its SPID entered at the terminal. The TEI may be dynamic (the MISP automatically assigns an unassigned TEI) or static (the TEI is manually entered on the terminal key pad)

Layer 3 initialization starts when the terminal transmits its SPID to the MISP using an information message. The MISP acknowledges the message and assigns a TSP to the terminal.

Non-initializing terminal with dynamic TEI assignment

A non-initializing terminal (such as a printer) does not support the dynamic endpoint identification procedure and is not associated with a SPID number. However, non-initializing terminals may support dynamic TEI assignment where the MISP automatically assigns an unassigned TEI when the terminal is installed or when the system or the cards are reset.

The range of the automatically assignable TEI numbers is from 64 to 126. Because these terminals do not support layer 3 initialization procedures, the MISP assigns the same default TSP to all terminals of this type on a specific DSL. The default TSP is defined by specifying USID= 0 in overlay 27.

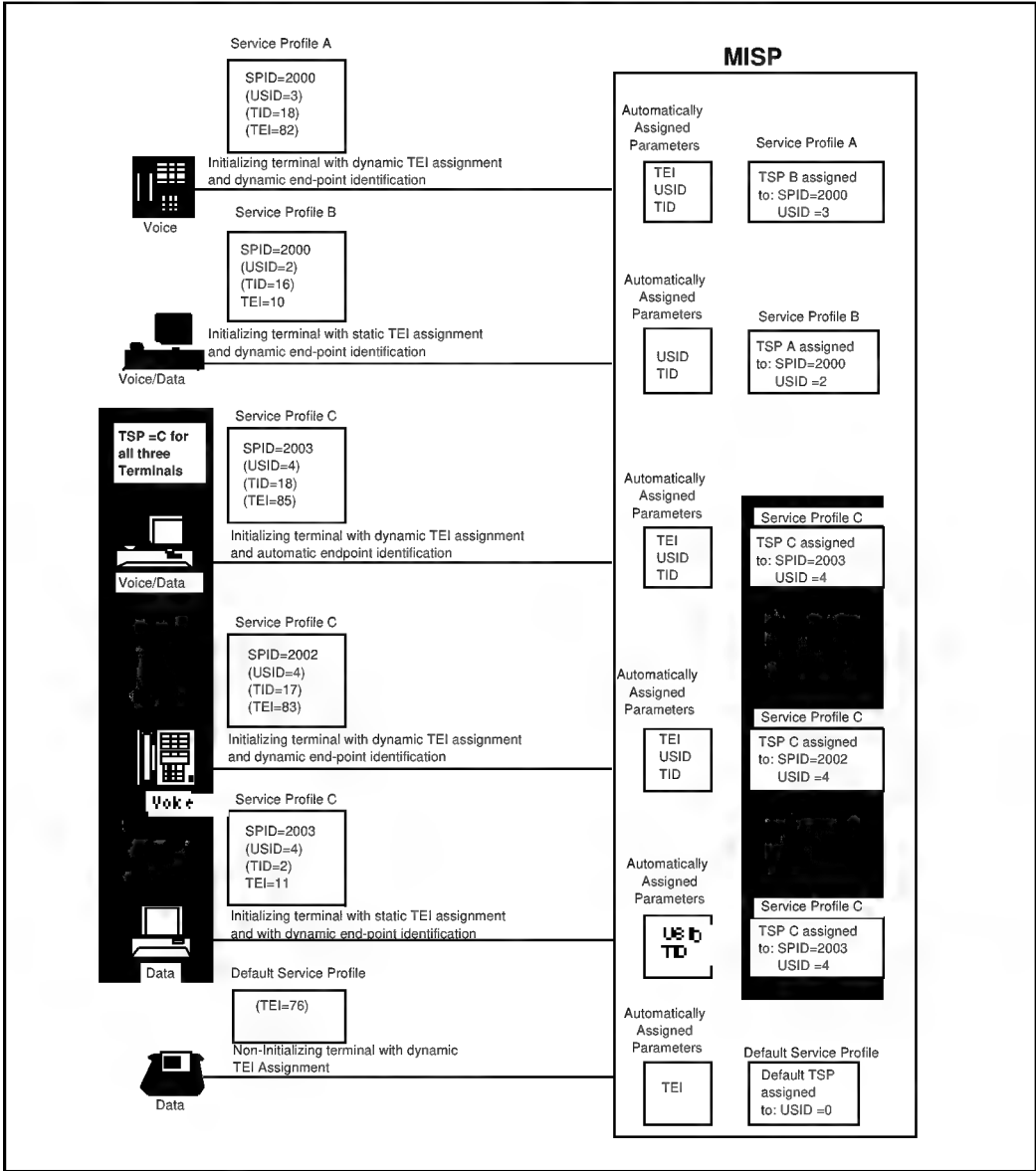
Non-initializing terminal with static TEI assignment

A non-initializing terminal (such as a printer) does not support the dynamic endpoint identification procedure and is not associated with a SPID number. The non-initializing terminals may support static TEI assignment where the user assigns an unassigned TEI by entering the TEI number on the terminal key pad when the terminal is installed or when the system or the cards are initialized.

The static TEI assignment is performed by entering an unassigned TEI number from 0 to 63 directly into the terminal using its key pad. Because these terminals do not support layer 3 initialization procedures, the MISP assigns the same default TSP to all terminals of this type on a specific DSL. The default TSP is defined by specifying USID= 0 in overlay 27.

Figure 23 shows different types of terminals and their relationship to each other when they are connected to the same DSL. It also shows how the terminal initialization parameters are handled for different types of terminals.

Figure 23
Terminal initialization and service profile assignment examples



Packet Data Configuration

Refer to Figure 24 for a diagram of packet handling flow.

D-channel packet data transmission

D-channel packet data from each DSL is multiplexed by the line card (SILC or UILC) into two sets of four D-channels and placed onto two 64 kbps connections for transmission to the MISP. The MISP separates the packet data from signaling and transmits the packet data over its dedicated connection to the PRI. A PRI B_D-channel is a dedicated 64 kbps clear B-channel that handles the D-channel packet data between the PRI and the DPN-100 external packet handler.

If the system is to uniquely identify the transmitted and received D-channel packet data for each terminal on a DSL, it must use an internal identification number. This identification number is called Logical Terminal Identifier (LTID) as defined in LD 27, which must be used together with the Logical Terminal Endpoint Identifier (LTEI) number during ISDN BRI configuration to uniquely define a logical terminal on a DSL. The LTEI is configured in Overlay 27.

To configure a terminal for D-channel packet data service, a specific LTID is assigned to an unused static LTEI and this information is sent to the MISP. The LTEI number is entered at the terminal and the LTID and the PRI B_D-channel information is entered at the DPN-100 packet handler. The LTEI is entered at the terminal (as previously configured in Overlay 27).

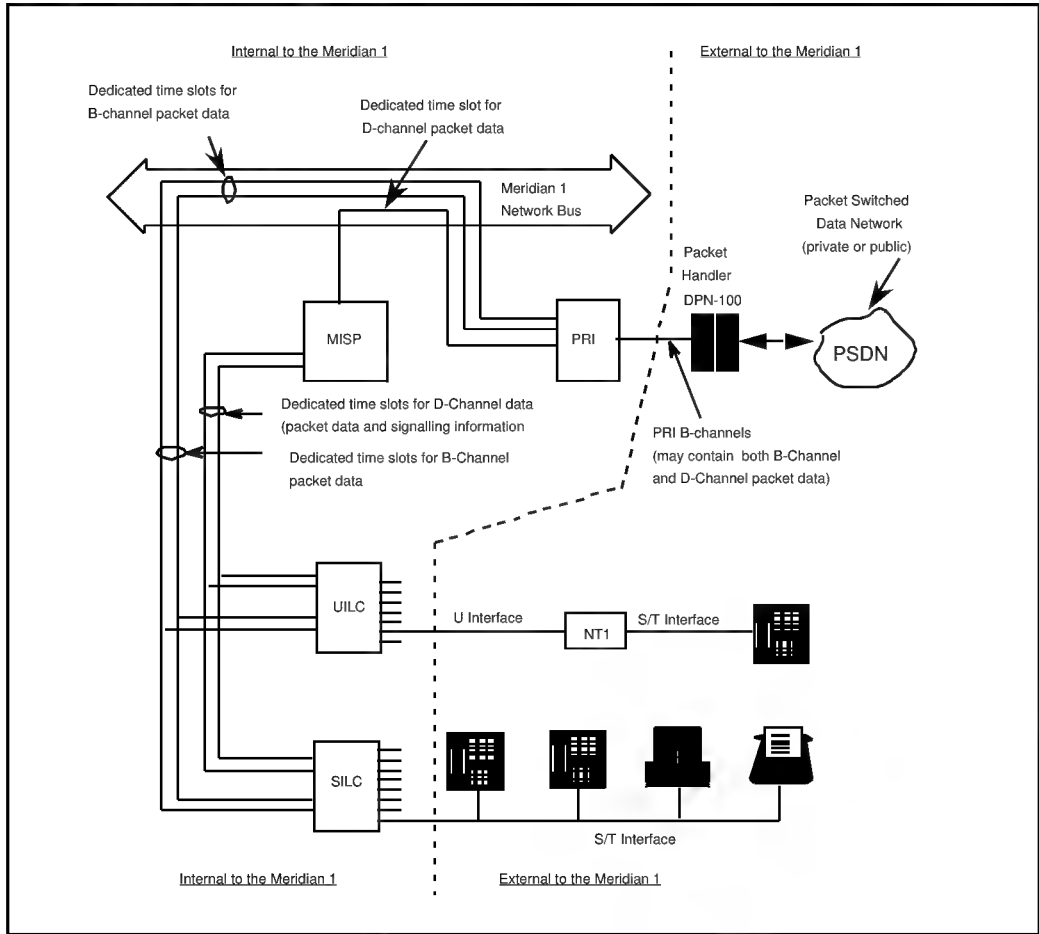
D-channel packet data service is determined separately for each MISP during ISDN BRI service configuration. When this data transmission method is selected during system configuration, you are prompted to enter the PRI loop and channel number to specify the dedicated connection to the packet handler. The Option 11 CPU sets up the B_D-channel to the packet handler and informs the MISP on which connection the B_D-channel is located.

B-channel packet data transmission

The B-channel packet data from each DSL is sent over the dedicated time slots to the PRI. A dedicated PRI B-channel handles the B-channel packet data between the PRI and the DPN-100 external packet handler. The number of dedicated B-channel time slots is limited to the number of available PRI channels.

The B-channels on a DSL are dedicated to the packet data transmission by assigning the packet mode data call to one or more B-channels on one or more DSLs during ISDN BRI service configuration. When the Option 11 CPU detects that the B-channel packet data transmission is being set up, it dedicates the PRI channel(s) to transmit this data to the packet handler if the PRI loop that is connected to the packet handler is configured in the MISP database.

Figure 24
Packet handling flow diagram



Hardware Requirements

Hardware requirements for ISDN BRI line and packet data applications are as follows:

Note: Items required for Packet Data implementation only are noted.

- MISP circuit card — NTBK22
- **SILC circuit card**
 - NT6D70AA — -48V North American S/T interface line card
 - NT6D70BA — -40V International S/T interface line card
- **UILC circuit card**
 - NT6D71 — U interface line card
- A0378866 — Terminating resistor
- PRI circuit card

Note: This item is required for packet data implementation only.

- NTAK09 — 1.5 Mb DTI/PRI circuit card
 - NTAK79 — 2.0 Mb PRI circuit card
 - NTBK50 — 2.0 Mb PRI circuit card, used in conjunction with the Downloadable D-channel application.
 - DPN-100 External Packet Handler
- Note:*** This item is required for packet data implementation only.
- ISDN BRI terminals
 - **M5317TDX**
 - Meridian 1 set equipped with voice and data transmission options and a hands-free feature; supports B-channel and D-channel packet data.
 - **M5000TD-1**
 - ISDN Terminal Adapter provides a connection to an analog telephone and supports circuit-switched or packet data; supports B-channel and D-channel packet data.
 - **Other terminals**
 - Any other terminal deemed compatible by Northern Telecom.

- **Terminal adapters**
Required if connecting non-BRI terminals to the ISDN BRI line interface.
- **Network Termination 1 (NT1)**
Needed when conversion from a U to an S/T interface is required.

NT1 unit

NT1 standard power supply

NTBK22 Multi-Purpose ISDN Signaling Processor (MISP) card

The MISP card (NTBK22) is an Option 11 specific card (Options 21 through 71 use the NT6D73AA). It performs Data Link (Layer 2) and Network (Layer 3) processing associated with the OSI protocol.

Each MISP can support 4 line cards (UILC or SILC or any combination of the two). Each line card supports 8 DSLs, therefore each MISP supports 32 DSLs. Since each DSL uses two B-channels and one D-channel the MISP supports 64 B-channels and 32 D-channels. If the MISP is carrying packet data, it must dedicate one of its D-channels to communicate with the external packet handler. In this case the MISP support only 31 DSLs. The MISP supports the downloading of ISDN applications from the Option 11 software cartridge. The MISP will be downloaded with the appropriate application code:

- on the first enabling of the MISP card
- when Option 11 Software is upgraded
- when MISP Applications are added/changed

The applications for the MISP are copied from the software cartridge into RAM on the MISP card. Only the new/different applications are downloaded. This information is then copied into the Flash ROM on the MISP for storage. This process requires approximately 10 minutes to complete and is carried out while the MISP pack is operational. The next time the system or MISP card resets, the application is loaded from the MISP Flash ROM provided there are no new or different applications on the software cartridge.

Use the equation below to calculate the number of MISPs required to control SILCs and UILCs.

$$(\text{SILCs} + \text{UILCs}) \div 4 = \text{MISPs}$$

If the result is a fraction, round it off to the next highest number.

NT6D70AA/NT6D70BA S/T Interface Line card (SILC)

The Option 11 SILC cards (NT6D70AA -48V North America, NT6D70BA -40 V International) are the same circuit cards used by the rest of the Meridian 1 product line. The SILC is a globally accepted standard interface. The SILC circuit cards support the OSI physical layer (layer 1) protocol.

The SILC provides eight S/T 4-wire full duplex polarity sensitive interfaces that are used to connect ISDN BRI compatible terminals over DSLs to the Option 11. Each S/T interface provides two B-channels and one D-channel and supports a maximum of eight physical connections that can link up to 20 logical terminals on one DSL. A logical terminal is any terminal that can communicate with the Option 11 over a DSL. It may be directly connected to the DSL through its own physical termination or be indirectly connected through a common physical termination.

The length of a DSL depends on the specific terminal configuration and the DSL wire gauge, however, it should not exceed 1 km (3,280 ft).

The SILC interface uses a 4 conductor cable that provides a differential Transmit and Receive pair for each DSL. The SILC has options to provide a total of 2 Watts of power on the Transmit or Receive leads, or no power at all. When this power is supplied from the S/T interface, the terminal devices must not draw more than the 2 Watts of power. Any power requirements beyond this limit must be locally powered.

A terminating resistor, (AO378866), must be placed at the end of each DSL associated with an S/T interface to ensure proper operation.

Other functions of the SILC are:

- support point-to-point and multi-point DSL terminal connections.
- execute instructions received from the MISP to configure and control the S/T interfaces.
- provide channel mapping between ISDN BRI format (2B+D) and Meridian 1 system bus format.

- multiplexes 4 D-channels onto one connection.
- perform activation and deactivation of DSLs.
- provide loopback control of DSLs.
- provide a reference clock to the clock controller.

SILCs required for non-blocking conditions

Use the equations below to calculate the number of SILCs required to provide interfaces for the S/T type ISDN BRI terminals for non-blocking traffic conditions. To provide a non-blocking traffic condition on a DSL a maximum of 2 B-channel terminals may be connected.

$$\text{SILC B-channel terminals} \div 16 = \text{SILCs}$$

Note: A physical terminal that can use two or more B-channels simultaneously such as circuit-switched voice and data, should be counted as two terminals for the purpose of this calculation.

$$\text{SILC D-channel terminals} \div 8 \text{ (See Note)} = \text{SILCs}$$

Note: This assumes one D-channel terminal per DSL, however, you can install more than one such terminal if their combined packet data transmission speeds do not exceed the D-channel throughput of 16 kbps.

If the result is a fraction, round it off to the next highest number. The larger of the two results obtained from the above two equations defines the number of SILCs required.

SILCs required in blocking conditions

If you accept blocking traffic conditions on DSLs, you can install any combination of B-channel and D-channel terminals on a DSL as long as the total number of physical terminations connecting these terminals to the DSL does not exceed eight. The greater the number of terminals on a DSL, the greater the traffic blocking.

If three or more B-channel voice or data terminals are connected to one DSL the following will occur:

— **Outgoing calls**

If there are two active calls on line, the third and subsequent telephone attempting to place a call will not receive dial tone. Calls cannot be placed from these sets until a B-channel becomes available.

— **Incoming calls**

See *BRI Special Hunting* in the features description chapter of this guide.

— **Data calls**

Data calls gets dropped.

To calculate the number of SILCs for a combination of terminals on a DSL, follow the equations below:

Total SILC B-channel terminals ÷ (number of B-channel terminals per DSLx 8) = SILCs

Total SILC D-channel terminals ÷ (number of D-channel terminals per DSLx 8) = SILCs

If the result is a fraction, round it off to the next highest number. The larger of the two results obtained from the above two equations represents the SILCs for blocking conditions.

NT6D71 U Interface Line Card (UILC)

The UILC interface supports a two-wire point-to-point loop consisting of a twisted pair engineered for 2B1Q line coding on the DSL. The Option 11 UILC card (NT6D71) is the same circuit card that is used by the rest of the Meridian 1 product line. It supports the OSI physical layer (layer 1) protocol. The UILC supports ANSI 2B1Q line encoding.

The UILC provides eight two-wire full duplex (not polarity sensitive) U interfaces that are used to connect ISDN BRI compatible terminals over DSLs to the Option 11 system. Each U interface provides two B-channels and one D-channel and supports one physical termination. This termination may be to a Network Termination (NT1) or directly to a single U interface terminal. Normally this physical termination is to an NT1, which provides an S/T interface that allows up to 8 physical terminals to be connected. The length of a DSL depends on the specific terminal configuration and the DSL wire gauge, however, it should not exceed 5 km (16,405 ft).

The main functions of the UILC are:

- provide eight ISDN U interfaces that use 2B1Q encoding.
- support point-to-point DSL terminal connections.
- provide channel mapping between ISDN BRI format (2B+D) and Meridian 1 bus format.
- multiplex 4 D-channels onto one connection.
- perform activation and deactivation of DSLs.
- provide loopback control of DSLs.

To calculate the number of **NT1s for non-blocking** operation take the larger resulting number from the two equations below:

$$S/T \text{ B-channel terminals} \div 2 = \text{NT1's}$$

Note: A physical terminal that can use two B-channels simultaneously such as circuit-switched voice and data, should be counted as two terminals for the purpose of this calculation.

$S/T \text{ D-channel terminals} \div 6 = \text{NT1's}$. This calculation is application sensitive. Up to 18 logical D-channel terminals may be connected as long as through-put does not exceed 16 kbps on D-channel

To calculate the number of **NT1s where blocking is acceptable** to allow maximum number of terminations on a DSL, use the two equations below:

$$S/T \text{ B-channel terminals} \div 16 = \text{NT1's}$$

Note: This equation assumes that each S/T interface connects eight physical terminals where each physical terminal can use two B-channels simultaneously such as circuit-switched voice and data.

$$S/T \text{ D-channel terminals} \div 20 = \text{NT1's (maximum of 20 TEIs per DSL)}$$

In both cases use the larger of the two results. If the result is a fraction, round it off to the next highest number. Add the number of NT1s to the number of true U interface terminals to determine the total number of UILC-supported terminals as follows:

Total UILC terminals = Number of NT1s + Number of true U interface terminals

For the sake of this calculation its fair to assume that each true U interface terminal represents an actual physical termination on a U interface type DSL.

To calculate the required number of UILCs to support the total number of UILC terminals (number of NT1s + number of true U interface terminals) in the system, use the following equation:

$$\text{UILCs} = \text{Total UILC terminals} \div 8$$

If the result is a fraction, round it off to the next highest number.

NTAK09/NTAK10/NTBK50 PRI card

Note 1: This item is required for packet data implementation only.

Note 2: Vintage NTBK50AA is required for Downloadable D-channel applications. When setting the timers for EuroISDN PRI2 loops in Overlay 73, the following settings are required:

If the Option 11 is connected to a local exchange that supports CRC-4 multiframing, enter CRC-4 in response to the MFF prompt, enter yes in response to the ACRC prompt (to select automatic CRC error reporting), and enter ALT in response to the ALRM prompt (to select alternate alarm mode).

If the Option 11 is connected to a local exchange that does not support CRC-4 multiframing, enter AFF in response to the MFF prompt, and enter ALT in response to the ALRM prompt (to select alternate alarm mode);

In response to the PERS prompt, enter 50 to set the alarm persistence timer to 100ms;

In response to the CLRS prompt, enter 1 to set the clearance persistence timer to 2ms.

ISDN PRI is required for packet data implementation to connect the Option 11 to the external packet handler (DPN-100). B and/or D-channel packet data is transmitted over clear 64 kbps PRI B-channels to the packet handler (a D-channel daughter board is not required). The maximum number of ISDN PRI channels available for communication with the packet handler should not exceed 23 with 1.5 Mb PRI or 30 with 2 Mb PRI.

Data Packet Network (DPN-100)

Note: This item is required for packet data implementation only.

Northern Telecom's Data Packet Network (DPN-100) is used as the external packet handler to process the B and/or D-channel packet data sent to it over PRI B-channels.

Network Termination 1 (NT1)

Stand-alone NT1 unit

The stand-alone NT1 product, which is typically installed at the user's work area, consists of the following units:

- the NT1 unit (NTBX80)
- the optional NT1 power supply (NTBX81)
- a mounting plate (P0706571).

The stand-alone NT1 unit is a two-part molded housing 210 mm (8.27 in.) by 108 mm (4.25 in.), its depth tapering from about 50 mm (2 in.) to about 32 mm (1.25 in). On the unit's housing are four LED status indicators and three connectors. The bottom of the unit holds four rubber feet for desk-mounting the unit, and four slides that are used to attach the unit to the mounting plate. The unit contains the single NT1 circuit pack assembly.

NT1 power supply unit

The stand-alone NT1 is powered by one of two methods:

- 1 The NT1 power supply unit (NTBX81), which converts 110 V ac input to provide -48 V dc for the NT1, and optionally for the TEs on the S/T bus.
- 2 A customer-provided -48 V dc supply rated a 2 W minimum for NT1 powering. Additional power may be provided to power the TEs on the S/T bus.

The NT1 power supply unit is virtually identical to the NT1 unit. It is a two-part molded housing of 210 mm (8.27 in.) by 108 mm (4.25 in.), its depth tapering from about 50 mm (2 in.) to about 32 mm (1.25 in.). On the units housing are three connectors, one of which is a captive power cord. The bottom of the unit holds four rubber feet for desk-mounting the unit, and four slides that are used to attach the unit to the mounting plate. The unit contains a single circuit pack assembly.

Cables

Two cables are provided with the NT1 power supply unit:

- a 178 mm (7 in.) cable (A0346581) for connecting between the power supply and the NT1 unit.
- a captive power cord for connection the an ac power outlet.

ISDN BRI terminals

Contact your Northern Telecom representative for the latest list of compatible terminals.

Installing ISDN BRI Hardware

Installation procedures

The following lists the procedures that should be followed in the order shown to install ISDN BRI equipment for line and packet data implementation. The Option 11 should already be installed and operating before performing these procedures.

Note: Steps required for packet data implementation only are noted.

- 1 Selecting the card slots.
- 2 Installing the MISPs.
- 3 Installing the SILCs and/or UILCs.
- 4 Installing the PRI hardware.

Note: This step is required for packet data implementation only.

- 5 Connecting ISDN BRI terminals.
 - Connecting Option 11 cables to the cross-connect terminal
 - Cross-connecting the wiring
 - Connect terminating resistor (A0378866) to the end of the SILC DSL
 - Connecting ISDN BRI terminals to the DSL
 - Initializing the terminals

Selecting the card slots

Refer to Table 12 for ISDN BRI circuit card assignments in the main and expansion Option 11 cabinets.

Note: Refer to the Option 11 Installation guide (553-3011-210) for instructions about adding a cabinet, if one is required.

Identify the card slots in the Option 11 cabinets that will house ISDN BRI cards. Refer to the *Card slot allocation plan* for the cabinets and identify vacant slots. (Refer to the *General installation and planning guide* — 553-3011-200, for information about the *Card slot allocation plan*.) The following rules apply when selecting the card slots:

- MISPs are inserted in the main cabinet in any available slots from 1 through 9.
- One MISP supports a set of four SILCs or UILCs, or a combination of both SILCs and UILCs.
- SILCs and UILCs can be installed in the main and expansion cabinets (slots 1 through 30)

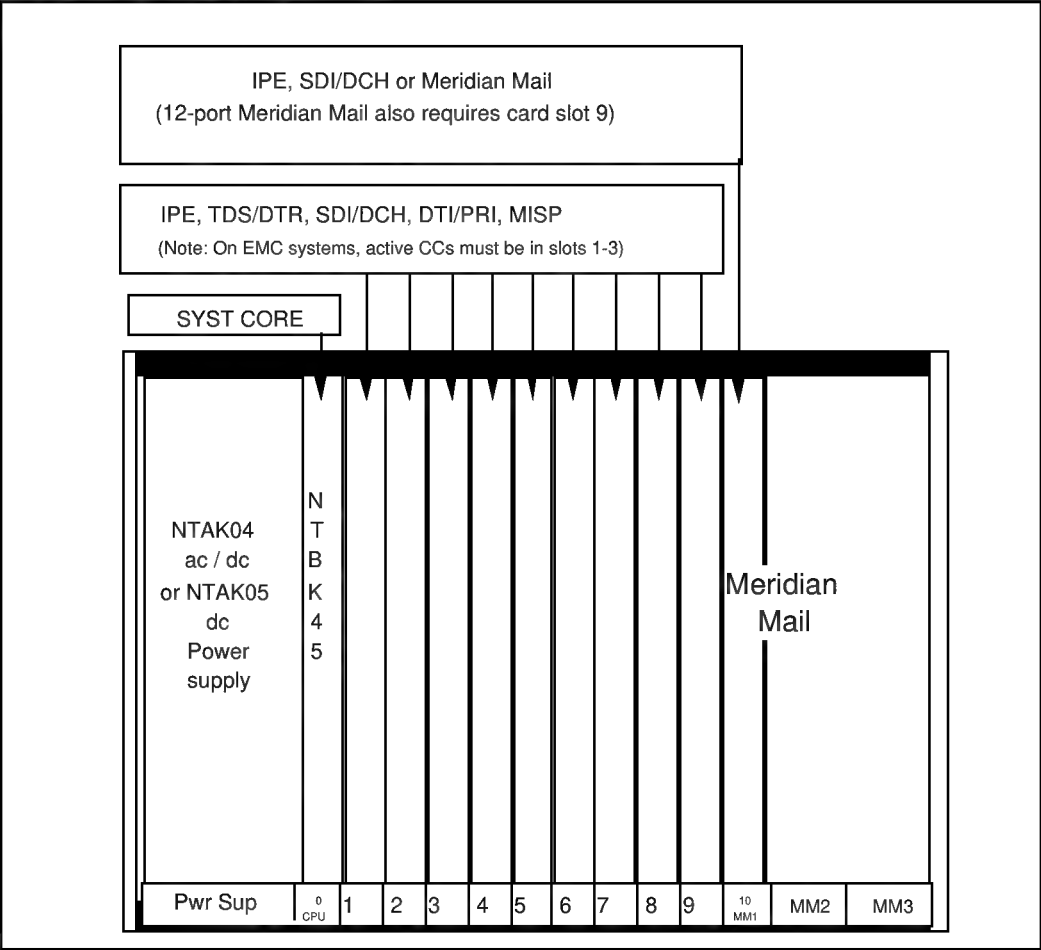
Note: A SILC serving as a clock source in trunk access applications must reside in the main cabinet (any of slots 1 through 9).

Table 12
ISDN BRI card location

ISDN BRI Circuit Card	Main Cabinet	Expansion Cabinet
MISP	Slots 1 through 9	—
SILC not used as a clock reference	Slots 1 through 9	Slots 11 through 30
SILC used as a clock reference	Slots 1 through 9	—
UILC	Slots 1 through 9	Slots 11 through 30

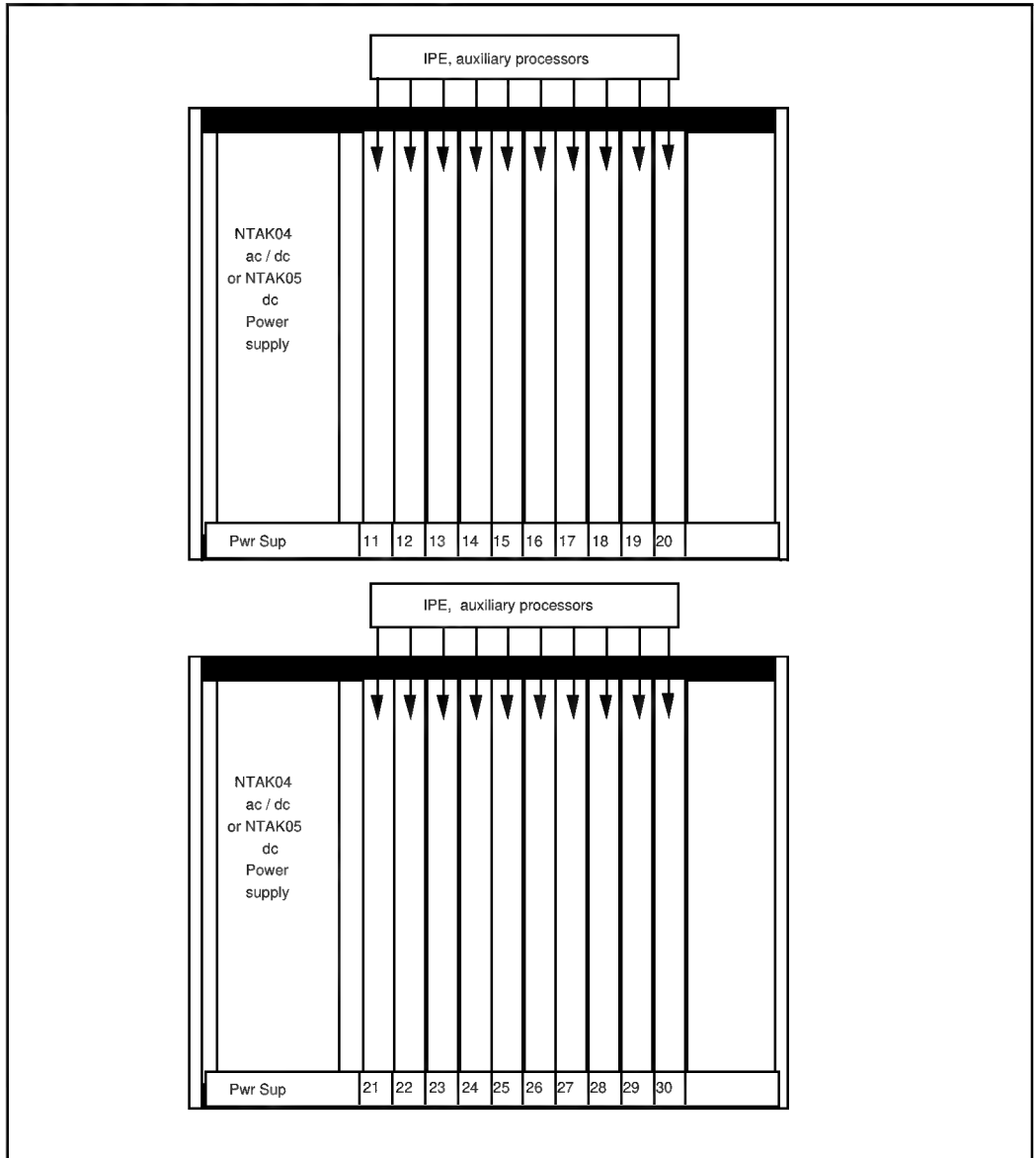
Figures 25 and 26 show typical configurations for the Option 11 and the card slots into which ISDN BRI cards can be inserted.

Figure 25
Shelf assignments, main cabinet



- Note 1:** The MISP circuit cards must reside in the main cabinet, slots 1 through 9. The Meridian Mail option, if it is equipped, requires slot 10 in the main cabinet.
- Note 2:** The SILC card must be installed in the main cabinet (slots 1 through 9) if it is used as a clock controller.

Figure 26
Shelf assignments, expansion cabinet



Installing the MISPs

The following procedure describes how to install MISPs into the Option 11 main cabinet. Refer to the *Card slot allocation plan* for the card slots assigned to MISP.

1 Remove the cover from the main cabinet.

CAUTION

The static discharge bracelet located inside the cabinet must be worn before handling circuit cards. Failure to wear the bracelet can result in damage to the circuit cards.

2 Remove the MISP from its shipping package and hold it by its card locking devices.

Note: While performing the next step observe the LED on the faceplate of the MISP.

3 Insert the MISP into the selected card slot and lock it in place.

The LED should light, flash three times then remain lit to indicate that the MISP is operating correctly but is not configured and enabled.

—or—

The LED should light, flash three times then extinguish to indicate that the MISP is operating correctly and is configured and enabled.

Any other LED indication suggests a defective MISP circuit card.

Note: The Flash ROM can become corrupted if loss of power occurs during programming of the Flash ROM. If this occurs, the Flash ROM will automatically be re-initialized when the MISP is installed (powered up). This operation will delay the completion of the self-test, and it will take five minutes for the LED to flash three times.

4 Repeat the steps in this procedure for each MISP being installed.

Installing SILCs and UILCs

The following procedure describes how to install SILCs and UILCs into the Option 11 cabinets. Refer to the *Card slot allocation plan* for the card slot assignments.

- 1 Remove the cover from the assigned cabinet.**

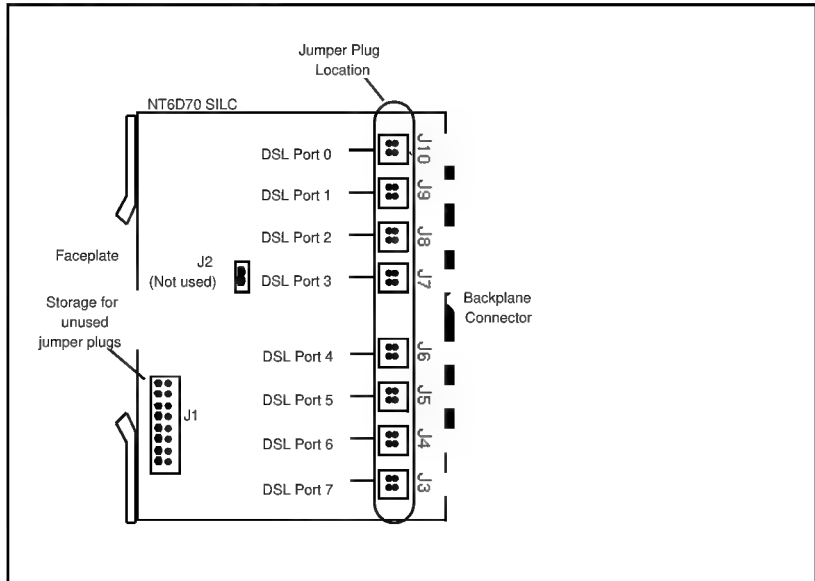
CAUTION

The static discharge bracelet located inside the cabinet must be worn before handling circuit cards. Failure to wear the bracelet can result in damage to the circuit cards.

- 2 Remove the SILC or UILC from its shipping package and hold it by its card locking devices.**
- 3 Configure the line powering options for the SILC using the jumper plugs. Each port is equipped with its own set of option jumper plugs to allow individual configurations for each DSL.**

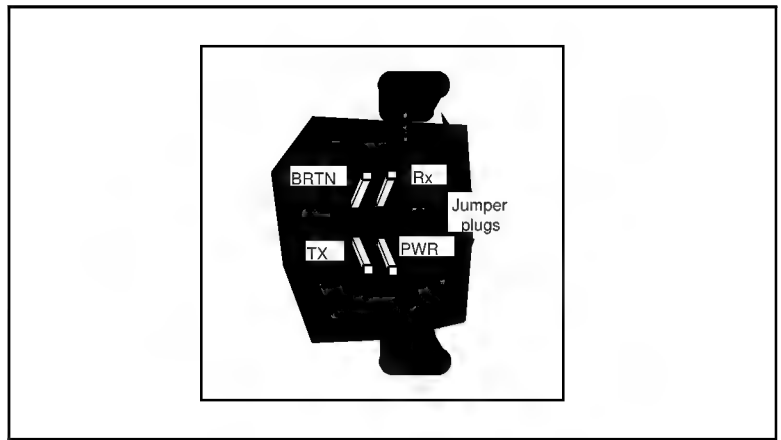
The SILC has three line powering options. These options are configured using the jumpers located near the backplane connector as shown in Figure 27.

Figure 27
Silc line power options

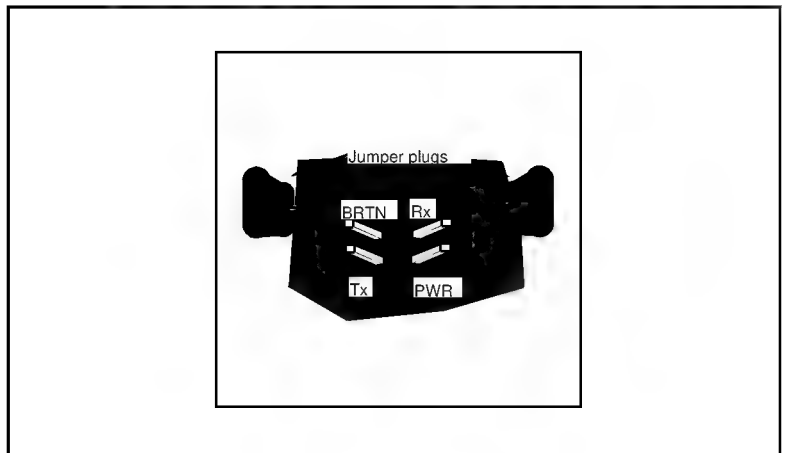


Unused jumper plugs should be stored on position J1 of the SILC for future use. The following describes the three options and their jumper settings.

- a Normal power on the Tx and Rx leads.** This option is set at the factory and provides normal power (-48 or -40 V) on the Tx lead and battery return (BRTN) on the Rx lead to power the terminal. It is implemented by installing one jumper plug across the Rx and BRTN pins, and one across the PWR and Tx pins as shown in the following illustration.



- b Reverse power on the Tx and Rx leads.** This option is used only in Japan and provides power (-48 or -40 V) on the Rx lead and battery return (BRTN) on the Tx lead to power the terminal. It is implemented by installing one jumper plug across the Rx and PWR pins, and one across the BRTN and Tx pins as shown in the following illustration.



- c **No power on the Tx and Rx leads.** This option is used when the terminal is powered locally with an adapter provided with the terminal.
It is also used when a SILC DSL is used for trunking. See Chapter 6 for trunking information.
Remove the jumper plugs and store them on J1 to implement this option.

Note: Observe the LED on the faceplate of the SILC or UILC while performing the next step.

- 4 Insert the SILC or UILC into the selected card slot and lock it in place.
The LED should light, flash three times, then remain lit to indicate that the card is operating correctly but is not configured.
—or—
The LED should light, flash three times, then extinguish to indicate that the card is operating correctly and is configured.
Any other LED indication suggests a defective circuit card.
- 5 Repeat the steps in this procedure for each SILC or UILC being installed.

Installing PRI hardware

Please refer to “Installing PRI hardware” in Appendix A —2Mb PRI implementation.

Connecting ISDN BRI terminals

To complete the installation of ISDN BRI equipment, the ISDN BRI terminals must be connected to the Option 11. This consists of:

- Connecting the Option 11 to the cross-connect terminal
- Cross-connecting the wiring
- Connecting the terminating resistor (A0378866) to the SILC DSL
- Connecting ISDN BRI terminals to the DSL
- Initializing the terminals

Modular cord is used to connect a terminal to a DSL. The maximum length of this connection is 10 m (3.5 ft) from the terminal to the RJ-45 jack.

Figure 28 shows a typical DSL and ISDN BRI terminals connected to the Option 11.

Connecting Option 11 cables to the cross-connect terminal

The following procedure describes how to connect the cables from the Option 11 cabinet to the cross-connect terminal.

Each card slot equipped with a SILC or UILC requires one NE-A25B 25-pair connector cable. The cables are connected to connectors located at the bottom of the cabinet and are routed through the openings in the lower part of the cabinet. Each connector is assigned to its corresponding card slot (example: connector J8 is assigned to card slot 8).

Connecting the cables

- 1 Remove the connector retaining bar from the connector panel in the lower part of each cabinet. See Figures 29, 30, and Figure 31.**
- 2 Connect an NE-A25B cable to each of the connectors associated with a card slot containing a SILC or UILC circuit card. See Figures 29, 30, and Figure 31.**

Make sure to tag both ends of each cable with the cabinet and connector numbers.

- 3 Route the cables down through the opening at the bottom of the cabinet.**
- 4 Replace the retaining bar when you have connected all the cables to the cabinet.**
- 5 Terminate the 25-pair cables installed at the cross-connect terminal.**
- 6 Label the cross-connect terminal for each connector (UILC or SILC).**

Figures 32 and 33 show the label used with the BIX cross connecting system.

Note: Use of the BIX cross-connect system is not mandatory. The Option 11 is designed to be used with other types of cross-connect equipment. Refer to the documentation provided with your cross-connect system for connection information.

Figure 29
Cable connectors in the main cabinet

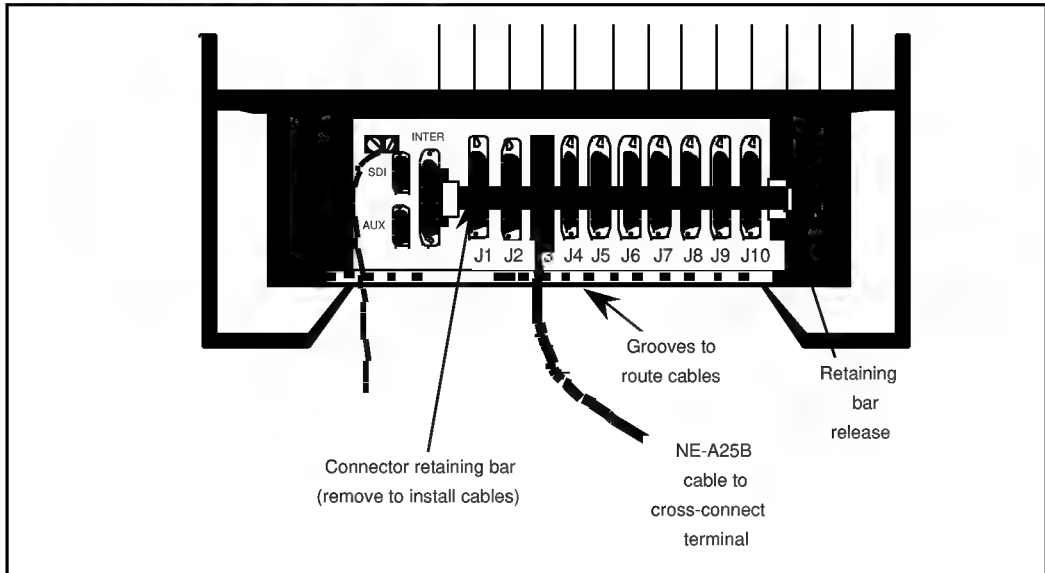


Figure 30
Cable connectors in the first expansion cabinet

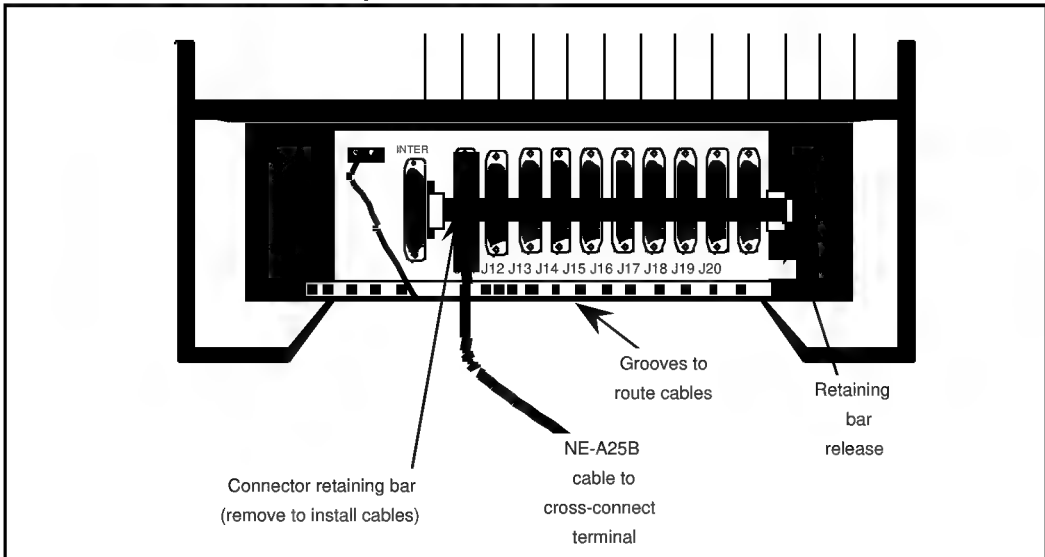


Figure 31 - Cable connectors in the second expansion cabinet

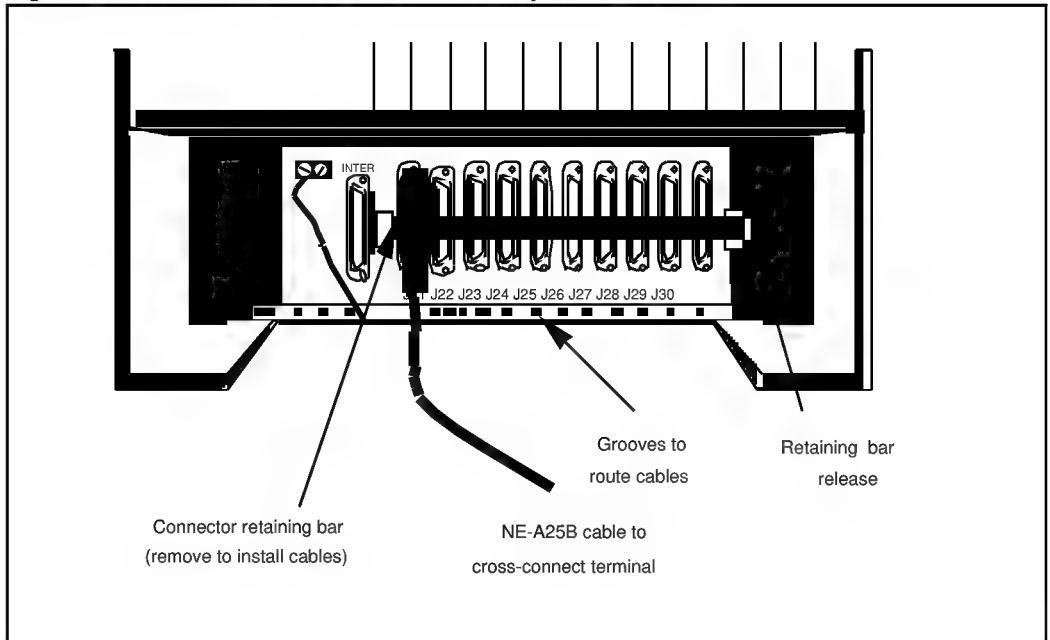


Figure 32
SILC port designation label at the cross-connect terminal

Tx-Tx+Rx+Rx- 0	Tx-Tx+Rx+Rx- 1	Tx-Tx+Rx+Rx- 2	Tx-Tx+Rx+Rx- 3	Tx-Tx+Rx+Rx- 4	Tx-Tx+Rx+Rx- 5	Tx-Tx+Rx+Rx- 6	Tx-Tx+Rx+Rx- 7
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Note: The pair designated Tx- Tx+ is the transmit pair. The pair designated Rx- Rx+ is the receive pair. a SILC port supplies 2 W of power at -48 V (-40 V for Europe), simplex over the transmit and receive pairs. The transmit pair is negative with respect to the receive pair.

Figure 33
UILC port designation label at the cross-connect terminal

T R 0	T R 1	T R 2	T R 3	T R 4	T R 5	T R 6	T R 7
----------	----------	----------	----------	----------	----------	----------	----------

Note: The cable pair designated T R is a 2B1Q full duplex U interface.

Cross-connecting DSLs at the cross-connect terminal

Each SILC provides eight four-wire full duplex ports. These ports are connected to building wiring to form DSLs. The DSLs are polarity sensitive and signal polarity must be maintained along each loop as shown in Figure 34.

Each UILC provides eight two-wire full duplex ports. These ports are connected to twisted pair building wiring to form DSLs as shown in Figure 35. The UILC DSLs are not polarity sensitive.

To cross-connect SILC and/or UILC ports to the building wiring:

- 1 Identify the card type (SILC or UILC) at the cross-connect terminal.**
- 2 Identify the transmit and receive connections for the SILC and the TIP and RING connections for the UILC from the label of the distribution strip.**

Refer to Table 13 to identify ports and their connections for a SILC or UILC.

- 3 Identify building wires connected at the cross-connect terminal.**
- 4 Cross-connect the pins from the SILC or UILC to the building wiring.**
- 5 Repeat this procedure for each DSL.**

Table 13
SILC and UILC port assignments connectors at cross-connect terminal

SILC Port Signals	UILC Port Signals	Connector Pin Number and Wire Color Code		Card Ports
0 Tx- 0 Tx+ 0 Rx- 0 Rx+	0 T 0 R	26 1 27 2	W-BL BL-W W-O O-W	Port 0
1 Tx- 1 Tx+ 1 Rx- 1 Rx+	1 T 1 R	28 3 29 4	W-G G-W W-BR BR-W	Port 1
2 Tx- 2 Tx+ 2 Rx- 2 Rx+	2 T 2 R	30 5 31 6	W-S S-W R-BL BL-R	Port 2
3 Tx- 3 Tx+ 3 Rx- 3 Rx+	3 T 3 R	32 7 33 8	R-O O-R R-G G-R	Port 3
4 Tx- 4 Tx+ 4 Rx- 4 Rx+	4 T 4 R	34 9 35 10	R-BR BR-R R-S S-R	Port 4
5 Tx- 5 Tx+ 5 Rx- 5 Rx+	5 T 5 R	36 11 37 12	BK-BL BL-BK BK-O O-BK	Port 5
6 Tx- 6 Tx+ 6 Rx- 6 Rx+	6 T 6 R	38 13 39 14	BK-G G-BK BK-BR BR-BK	Port 6
7 Tx- 7 Tx+ 7 Rx- 7 Rx+	7 T 7 R	40 15 41 16	BK-S S-BK Y-BL BL-Y	Port 7
Note: The cable pair designated Tx- Tx+ is the transmit pair and the pair designated Rx+ Rx- is the receive pair of the S/T interface. The cable pair designated T R is the Tip and Ring of the 2B1Q full duplex U interface.				

Figure 34
Cross-connecting a SILC port to the office wiring

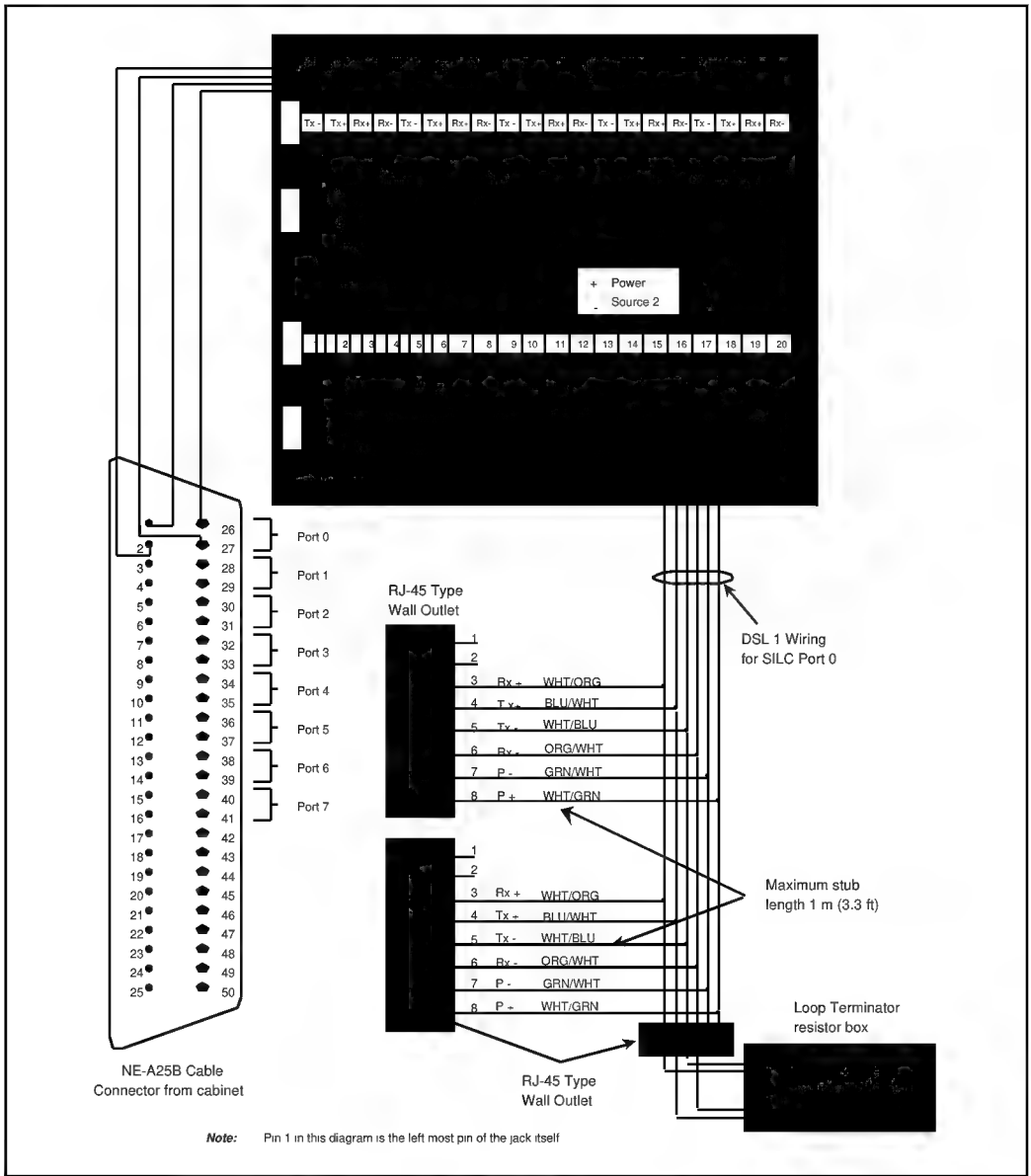
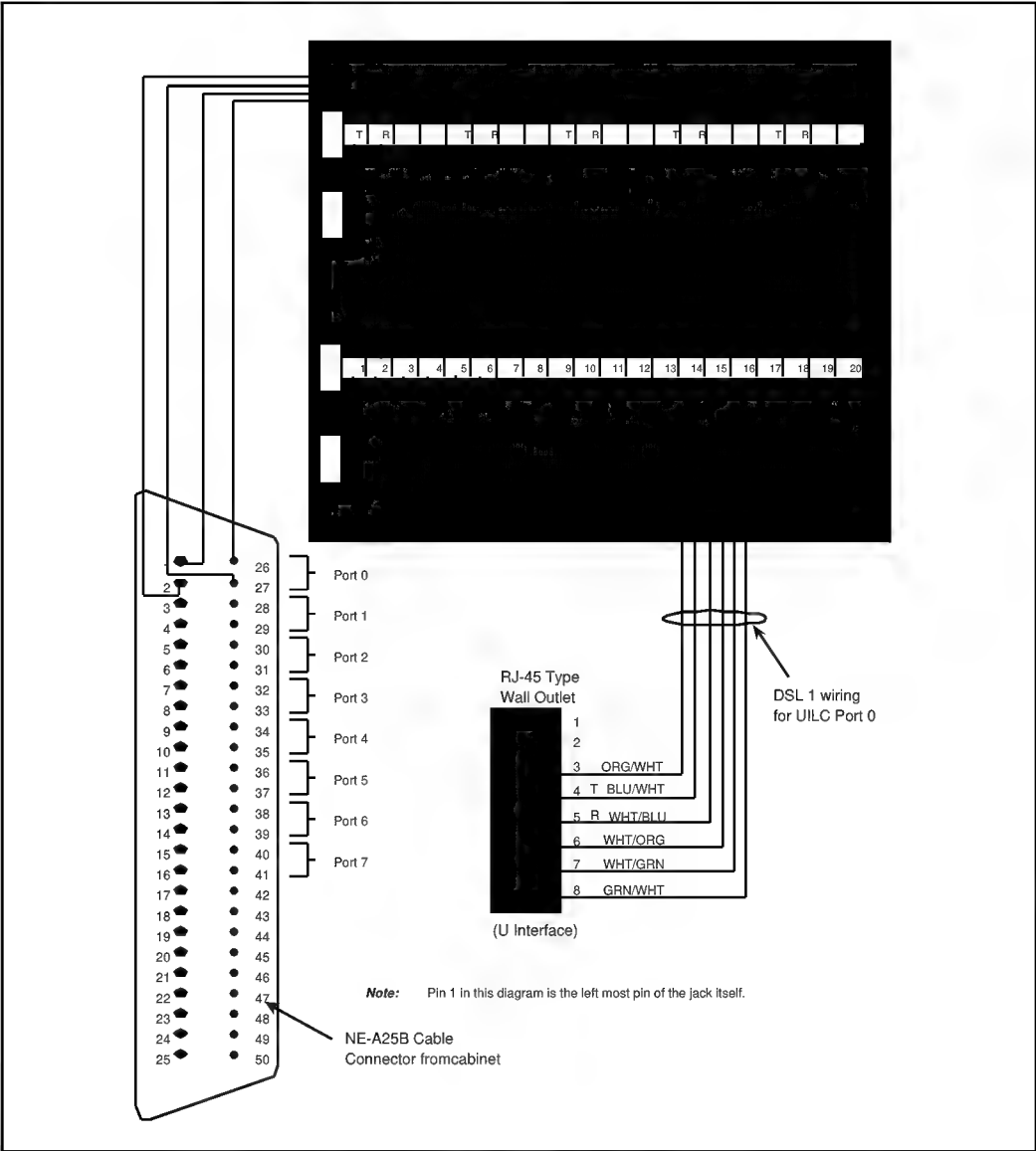


Figure 35
Cross-connecting a UILC port to the office wiring



Connecting the terminating resistor

Connect the terminating resistor (A0378866) to the end of the SILC DSL by plugging the DSL to the RJ-45 jack on the resistor.

Connecting ISDN BRI terminals to the DSL

ISDN BRI terminals are connected to DSLs using modular cables not longer than 10 m (33 ft) with RJ-45 type plugs on each end. One end of the cable is plugged into the terminal and the other end is plugged into the telephone outlet.

Note: All terminals should comply with one of the following protocols: ETSI NET-3, INS NET-64, NUMERIS or ANSI standards for ISDN BRI terminals and be deemed compatible with Meridian 1. Contact your Northern Telecom representative for the latest list of compatible terminals.

To connect 1TR6 terminals, an ETSI NET-3 to the 1TR6 protocol converter is required. A terminal adapter (the S_O-Adapter) has been specifically designed to interface with the ISDN BRI DSL and the 1TR6 terminals. Its main function is to convert 1TR6 protocol, sent from the 1TR6 terminal into the ETSI NET-3 protocol required for ISDN BRI. See the user guide for configuration details.

S/T interface specification

The S/T interface uses an 8-conductor modular cable terminated with an 8-pin RJ-45 type plug. An 8-pin RJ-45 type jack located on the terminal is used to connect the terminal to the DSL using this modular cable.

Table 14 shows the connector pin assignment for the jack and the plug. It also shows the signal names for each interface pin at the SILC and at the terminal.

Table 14
S/T interface connector specification

Pin Number	RJ45 Jack Pin Signal Name	SILC Signal Name
1	Power Source 3	No connection
2	Power Source 3	No connection
3	Tx +	Rx +
4	Rx +	Tx +
5	Rx -	Tx -
6	Tx -	Rx -
7	Power Sink 2 (-)	No connection
8	Power Sink 2 (+)	No connection

Note: Power source 1 (PS1): Up to 2 Watts of power is supplied by the SILC to the terminals on the DSL. This power is simplexed over the Tx and Rx pairs provided by -48 V (-40 V for Europe) supply on the SILC. The Rx pair is positive with respect to the Tx pair.

Power Sink 2 (PS2) provides an optional means of powering the terminal from a common supply in the wiring closet.

Power Source 3 (PS3) provides the power from the terminal to the NT1 if the NT1 does not have a local power source.

U interface specification

The U interface uses a 2-conductor twisted pair cable terminated with a RJ-45 type jack. An RJ-45 type jack located on the NT1 device is used to connect the terminal to the DSL using this twisted pair cable.

The connector pin assignments for the jack and the plug are shown in the Table 15. The table also shows the signal names for each interface pin at the UILC and at the terminal.

Table 15
U interface connector specification

Pin Number	RJ45 Jack Pin Signal Name	UILC Signal Name
1	Not used	No connection
2	Not used	No connection
3	Not used	No connection
4	Tip or Ring	Tip or Ring
5	Tip or Ring	Tip or Ring
6	Not used	No connection
7	Not used	No connection
8	Not used	No connection

To connect ISDN BRI terminals to DSLs:

- 1 Plug one end of the modular cable into the ISDN BRI interface connector on the terminal and the other end of the modular cable into the telephone outlet.**
- 2 For a SILC S/T interface with an optional auxiliary power source, plug the power source into the wall outlet and then the 10-m (33-ft) modular cable into the power source's RJ-45 type jack.**

The power source must not feed the power back into the DSL through the RJ-45 wall outlet, only to the local ISDN BRI terminal. The power adapter is normally supplied with the terminal.

Figure 36 illustrates an ISDN BRI terminal connection to an S/T interface. Figure 37 illustrates an ISDN BRI terminal connection to a U interface.

- 3 Enter the Static TEI at the terminal.**

Note: Do not perform this step to assign Dynamic TEIs since they are automatically assigned.

- 4 Enter the Service Profile ID number at the terminal.**

For detailed information about this procedure, refer to the terminal user guide.

- 5 Repeat steps 1 to 3 for each ISDN BRI terminal to be connected.**

Figure 36
Connecting the ISDN BRI terminal to the S/T interface

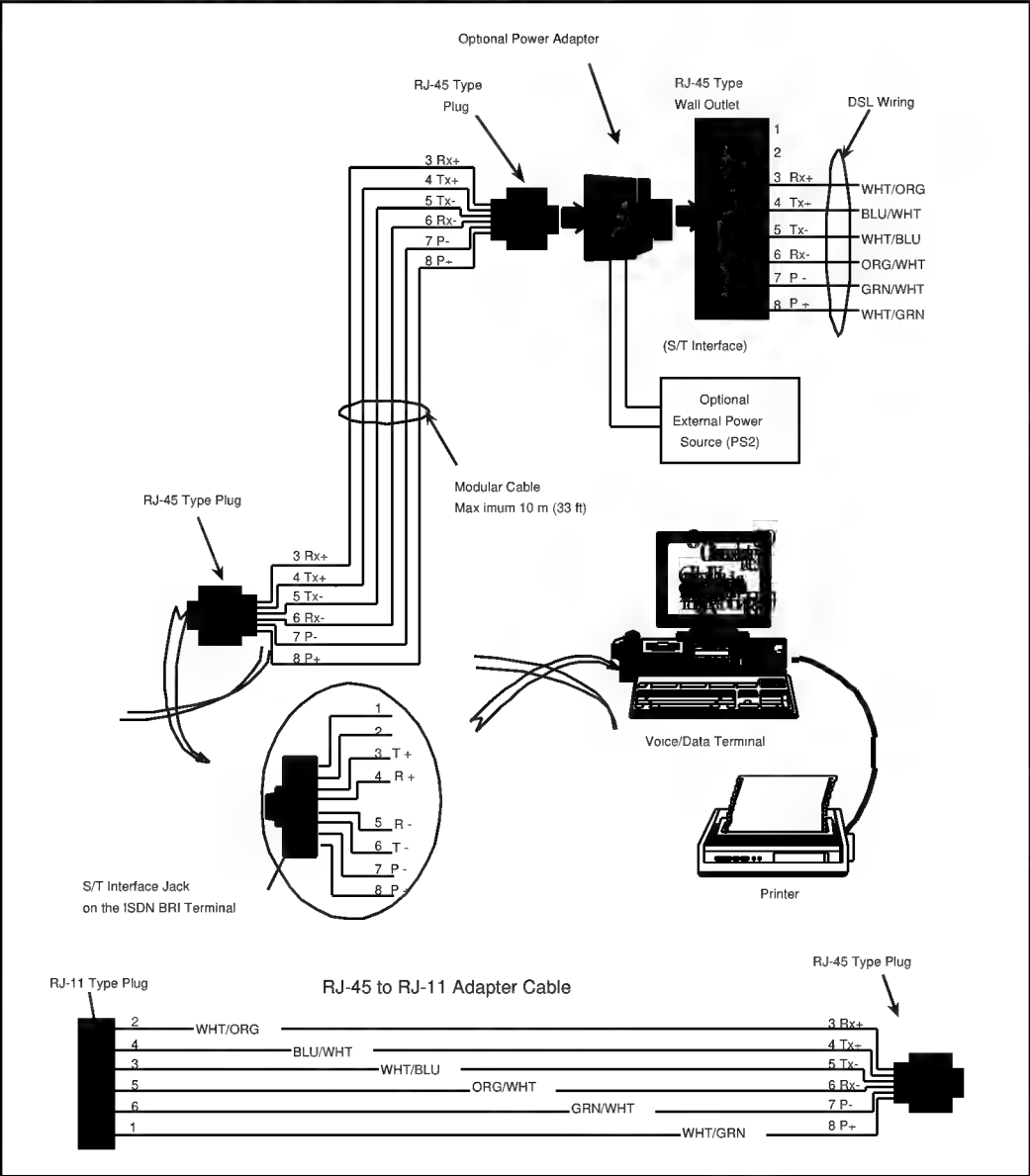
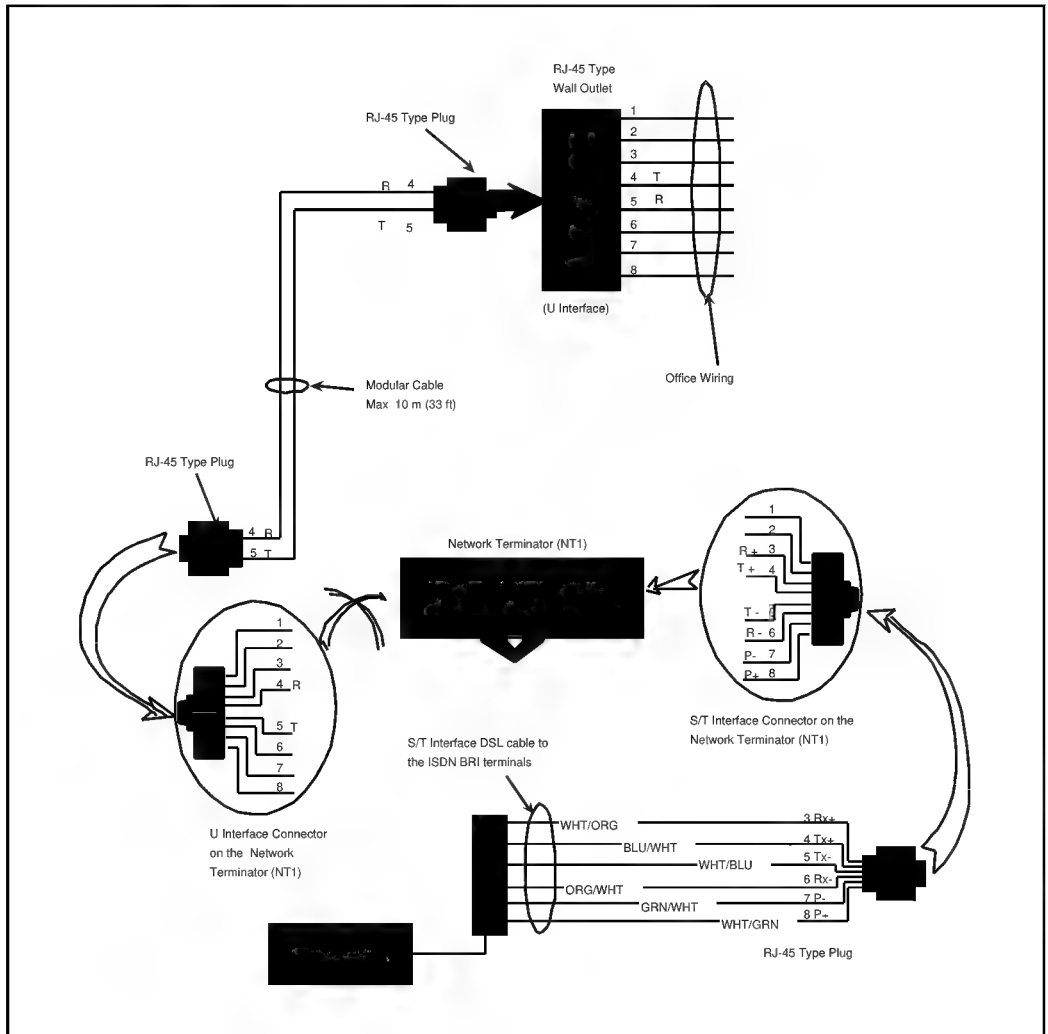


Figure 37
Connecting the ISDN network terminator to the U interface



Initializing a Northern Telecom M5317TDX terminal

The following is an example of the steps to follow to initialize an M5317TDX terminal. Table 16 is a list of error codes that may appear during terminal initialization and their meaning. Additional information is contained in the M5317TDX user guide.

- 1 Set the switch on the bottom of the terminal for either line power or local power.**
- 2 Plug in the M5317TDX terminal while holding down the RLS and HOLD keys as it powers up.**
- 3 Press MAINROM.**
- 4 Press INSTALL.**
- 5 Press ENGLISH or FRANCAIS for your choice of language.**
- 6 Press the soft key of the TEI you want to set PHONE, DATA or X25.**

Note: With minimum firmware version 2.0 only dynamic TEI is supported.

- Enter * for dynamic TEI.
- Enter the TEI on the terminal keypad for static TEI.

- 7 Press OK when you have finished setting the TEIs.**
- 8 Enter the phone (voice) SPID. Press OK when finished.**
- 9 Enter the data SPID. Press OK when finished.**
- 10 Enter the data DN. Press OK when finished.**
- 11 Press HEADSET until REAR is displayed.**
- 12 Press SIGTYPE until MER1 is displayed.**
- 13 Press A/MU until MU-LAW is displayed.**
- 14 Press MORE.**
- 15 Press DIALPLN until NATIONAL is displayed.**
- 16 Press EXIT.**
- 17 Press NO for execute SPM.**

- 18 Press YES for Enter datafill.**
- 19 Press YES to delete existing datafill.**
- 20 Press KEY# then enter on the keypad the key number you would like to program.**
- 21 Press EDIT DN then enter on the keypad the DN's digits.**
- 22 Press OK then SAVE after each DN.**
- 23 Repeat steps 17-22 for each voice DN keypad you want. Press EXIT after all DN keys have been entered.**
- 24 If you made a mistake, press INSTALL and begin at step 3. If the entries were correct, press EXIT.**
- 25 Make a voice call to make sure the telephone is operational.**

Table 16
M5317TDX terminal error codes

Error Code Number	Description
>>10<<	S/T-loop sync loss and/or Frame sync loss
>>11<<	L1 transmit timer expired
>>21<<	Voice TEI removed by network
>>22<<	Circuit data TEI removed by network
>>23<<	Voice and circuit data TEI removed
>>24<<	X25 TEI removed
>>25<<	Voice and X25 TEI removed
>>26<<	Circuit data and X25 TEI removed
>>27<<	All TEI removed
>>28<<	Voice link not established
>>29<<	Circuit data link not established
>>2A<<	X25 link not established
>>2B<<	No Layer 2 link established
>>30<<	No Layer 3 link established
>>31<<	No valid voice SPID
>>32<<	No valid data SPID
>>90<<	Restricted power mode in use. Lower ringer and speaker phone volumes apply.

Initializing a Northern Telecom M5000 terminal adapter

The M5000 is Northern Telecom's Universal Terminal Adapter (UTA). It adapts a non-BRI data terminal or a 500/2500-type telephone to the ISDN BRI protocol. A terminal must be attached to the M5000 terminal adapter to initialize it. Refer to the M5000 terminal adapter user guide for detailed configuration procedures.

Programming procedures for line application and packet data transmission

You must configure the following components in the order listed below to configure ISDN BRI lines and/or packet data. Items required for packet data implementation only are noted.

1 Optional: Configure a pad table using LD 73.

This step is optional since if no pad values are configured the default values will be used.

Note: Pad table used for lines only when the protocol to be used on a DSL is set to ETSI NET-3, INS NET 64, Numeris or QSIG.

2 Configure the LAPD Protocol Group using LD 27.

3 Configure the MISP using LD 27.

4 Configure the SILC or UILC using LD 27.

Note: This step is optional. The SILC or UILC can also be configured when configuring the DSL (see next step).

5 Configure the DSL using LD 27.

6 Configure the TSP using LD 27.

7 Configure the ISDN PRI trunk loop, route and channel assignments for packet data transmission using LD 15, LD 17, LD 16 and LD 14 respectively.

The prompts and responses listed in the following overlay tables are specific to the line and packet data applications. For a complete list of the prompts and responses for any of the overlays listed, refer to the *X11 Software Guide Including Supplementary Features*.

Configuring pad tables

ISDN BRI software programming: Configuring pad tables, using overlay 73 (Optional). (Pad table can be used only for lines when the protocol to be used on a DSL is set to ETSI NET3, INS NET64 or Numeris.)

This step is optional since if no pad values are set the default values will be used. Define the pad settings if required. The digital pad provides gain or attenuation values to condition the level of the digitized transmission signal according to the network loss plan. This determines transmission levels for the B-channel circuit-switched voice calls.

LD 73 —Configuring pad tables

Prompt	Response	Comment
REQ	NEW	New settings
TYPE	BRIL	Table type
FEAT	PAD	Set the pad values
PDCA	1-16	PAD Category table. If one channel is using the specified table, then the command is aborted. Table 1 cannot be modified or deleted.
TNLS	YES (NO)	TN List. This is for the print command only. A YES response means that a list of the trunk TNs using the requested PAD category tables will be printed after the table.
PDCA	1-16	PAD Category table. Table 1 cannot be modified or deleted.
DFLT	(1)-16	For NEW only. The table is used for default values.
The following prompts define the pad levels. The receiving pad code is <i>r</i> and the transmission pad code is <i>t</i> . These entries have the range 0-26. The pad values (in decibels) relating to these codes are shown after this table.		
ONP	<i>r t</i>	On-premises extension
DSET	<i>r t</i>	Meridian Digital Set
OPX	<i>r t</i>	Off-premises extension
DTT	<i>r t</i>	Digital TIE trunks
SDTT	<i>r t</i>	digital Satellite TIE trunks
NTC	<i>r t</i>	Nontransmission compensated
TRC	<i>r t</i>	Transmission compensated
DCO	<i>r t</i>	digital COT, FEX, WAT, and DID trunks

Prompt	Response	Comment
VNL	r t	VIA NET LOSS
DTO	r t	2Mb DTI digital TOLL office trunks
ACO	r t	Analog local exchange or WATS trunks
AFX	r t	Analog FEX trunks
ADD	r t	Analog DID trunks
SATT	r t	Analog satellite TIE trunks
ATO	r t	Analog TOLL office trunks
PRI2	r t	2Mb PRI trunk (prompted only if the 1.5/2Mb Gateway feature is equipped and TYPE=2Mb PRI) Author's Note—p7/dave/gateway
XUT	r t	Analog local exchange trunk (prompted only if the 1.5/2Mb Gateway feature is equipped and TYPE=PRI2) Author's Note—p7/dave/gateway
XEM	r t	Analog TIE trunk (prompted only if the 1.5/2Mb Gateway feature is equipped and TYPE=PRI2) Author's Note—p7/dave/gateway
BRIL	r t	Basic Rate Interface Line
BRIT	r t	Basic Rate Interface Trunk
....		

The following table shows pads codes and their values. Positive dB represents loss and negative dB represents gain.

Pad codes and values

code	0	1	2	3	4	5	6	7
value (dB)	0.0	+1.0	+2.0	+3.0	+4.0	+5.0	+6.0	+7.0
code	8	9	10	11	12	13	14	15
value (dB)	+8.0	+9.0	+10.0	+11.0	+12.0	+13.0	+14.0	-1
code	16	17	18	19	20	21	22	23
value (dB)	-2	-3	-4	-5	-6	-7	-8	-9
code	24	25	26					
value (dB)	-10	idle	+0.6					

Configuring the LAPD protocol group

A protocol group is added by using LD 27 and specifying its protocol group number. You also change its LAPD parameters or accept the default values. LAPD is a transmission protocol that specifies the transmission timers, the maximum number of retransmissions, the size of the data frame, and the number of negative acknowledgments before the system issues an alarm.

LD 27 — Configuring the LAPD protocol group

Prompt	Response	Comment
REQ	NEW	Add an ISDN protocol group
TYPE	LAPD	LAPD Protocol group
PGPN	0-15,<cr>	Protocol group number The values for this prompt are: 0-15=Adds a specified protocol group <cr>=Stops this prompt from being displayed again
LAPD	YES,(NO)	LAPD parameters —The values for this prompt are: YES=Define or modify the LAPD parameters NO=Does not prompt the LAPD parameters and assigns the default values shown in () to these parameters.
T200	(2)-40	Retransmission timer specifies the time delay before the system retransmits the information. Delay is in increments of 0.5 seconds.
T203	4-(20)-80	Maximum time between transmission frames Delay is in increments of 0.5 seconds.
N200	1-(3)-8	Maximum number of retransmissions of unsuccessfully transmitted information.
N201	4-(260)	Maximum number of contiguous octets or bytes of information.
K	(1)-32	Maximum number of outstanding negative acknowledgment (NAKs) allowed before alarming the system.
N2X4	<cr>	For 1TR6 connectivity — number of status inquiries when the remote station is in peer busy state.
PGPN	<cr>	Press <cr> to prevent repetition of all the parameters starting with LAPD.

Configuring a MISP

A MISP is added to the system by specifying its card slot number using LD 27. You must also determine if the MISP will handle packet data and specify the PRI loop and channel numbers that will be used to transmit packet data to and from the packet handler.

LD 27— Configuring a MISP

Prompt	Response	Comment
REQ	NEW	Add an ISDN BRI MISP
TYPE	MISP	MISP
LOOP	1-9	MISP card slot number
APPL	BRIL	Application type for the MISP. APPL defaults to BRIL if BRIL is equipped; otherwise, it defaults to BRIT. A message of “DEFAULT TRUNK APPL CONFIGURED” or “DEFAULT LINE APPL CONFIGURED” is displayed as appropriate. APPL is prompted until <cr> is entered.
DSPD	YES, (NO)	YES = D-channel Packet Switched Data NO = No D-channel Packet Switched Data. If NO is entered, subsequent prompts will be skipped.
MPHC	(YES), NO	Note: A response to this prompt is only required for packet data implementation. YES = DPSD are routed to a MPH NO = DPSD are routed to an external packet handler or PSDN. The MPH is not supported on Option 11. Respond MPHC = NO to choose the external packet handler.
TN	III ch	III (0-159) = PRI loop number ch (1-23) = The PRI channel on which the dedicated B-channel connection from the MISP is terminated.

Configuring a SILC or UILC

A new SILC or UILC is added by specifying its location, card type, and the MISP card slot that this card uses to transmit and receive signaling and D-channel packet data.

Note: You have an option of skipping this step and specifying the card type when you configure the DSL. This procedure is used when you want to configure the cards without configuring its DSLs.

LD 27 — Configuring a SILC or UILC line card

Prompt	Response	Comment
REQ	NEW	Add a SILC or UILC line card
TYPE	CARD	SILC or UILC line card
DSL	c or c 0 0	Card slot location The values for this prompt are 1-20
MISP	1-9	MISP card slot number
CTYP	SILC,UILC	Card type to be added

Configuring a line DSL

A DSL is added by specifying its port location and its DSL characteristics. A DSL port location specifies a SILC or UILC port that is connected to a DSL.

LD 27 — Configuring a line DSL

Prompt	Response	Comment
REQ	NEW	Add a DSL
TYPE	DSL	DSL
DSL	cc dsl#	DSL location The values for this prompt are: cc (card)=1-20 dsl# (DSL number)=0-7 Note: You can assign only 31 DSLs for each MISP if you specified DCH or BDCH at the PH prompt in <i>MISP configuration procedures</i> .
OPT	BRIL	ISDN BRI line Application

Prompt	Response	Comment
DES	x...x	Designator you assign to a DSL (example, BUILD2) The values for this prompt are: x...x=1 to 6 alphanumeric DSL designator
CUST	0-31	Customer number
CTYP	SILC,UILC	SILC or UILC line card Note: This prompt is displayed only if the SILC or UILC has not been previously configured, or if another DSL has not been configured on the same SILC/UILC.
MISP	1-9	MISP card slot number This prompt is displayed only if the MISP has not been assigned to the specified SILC or UILC.
MODE	NTAS,NTFS	Network terminal line sampling mode The values for this prompt are: NTAS=Adaptive sampling Extended passive bus, Branched passive bus, Point-to-point bus NTFS=Fixed sampling Short passive bus This prompt is displayed only if you specified the card type as SILC and defaults to NTAS.
B1CT	(VCE) (DTA) PMD XPMD	B-channel 1 call type. VCE = Circuit switched voice DTA = Circuit switched data PMD = B-channel packet data with dedicated connection from DSL to a PRI channel using external packet handler. For B1CT = PMD, B-channel packet data must have been specified at the PH prompt in LD27. PMD cannot be combined with any other options. Do not select <cr> which defaults to VCE (circuit switched voice) and DTA (circuit switched data) which may not run concurrently with packet data. XPMD = Delete PMD call types. Enter <cr> to select voice and data as defaults.

Prompt	Response	Comment
TN	Ill ch	Ill (0-159) = PRI2 loop number which is connected to the external packet handler or the Packet Switched Data Network. ch (1-30) = the PRI2 channel on which the dedicated B-channel dedicated connection from the DSL B-channel is terminated. TN prompt is given only if call type = PMD. The PRI channel must be configured in LD17 and dedicated only to the connection of an external packet handler.
B2CT	(VCE) (DTA) PMD XPMD	B-channel 2 call type VCE = Circuit switched voice DTA = Circuit switched data PMD = B-channel packet data with dedicated connection from DSL to a PRI channel using external packet handler. For B2CT = PMD, B-channel packet data must have been specified at the PH prompt in LD27. PMD cannot be combined with any other options. Do not select <cr> which defaults to VCE (circuit switched voice) and DTA (circuit switched data) which may not run concurrently with packet data. XPMD = Delete PMD call types.
TN	Ill ch	Enter <cr> to select voice and data as defaults. Ill (0-159) = PRI2 loop number which is connected to the external packet handler or the Packet Switched Data Network. ch (1-30) = the PRI2 channel on which the dedicated B-channel dedicated connection from the DSL B-channel is terminated. TN prompt is given only if call type = PMD. The PRI channel must be configured in LD17 and dedicated only to the connection of an external packet handler.

Prompt	Response	Comment
LDN	0, 1, 2, 3 (NO)	Departmental listed directory number The values for this prompt are: 0, 1, 2, 3=Departmental listed directory number specified in Customer Data Block Program LD 15 NO=No departmental listed directory number associated with the DSL
XLST	(0)-254	Pretranslation group. This prompt appears if configured in customer data block.
MTEI	1-(8)-20	Maximum number of Terminal Endpoint Identifiers, both static and dynamic combined which can be assigned to the logical terminals on this DSL.
LTEI	n1 n2 mm, <cr>, Xmm	n1 = Logical Terminal Identifier (LTID) n2 = static Terminal Endpoint Identifier (TEI) mm (0-63) = MTEI, the maximum number of LTID and TEI n1 = 0 -15 and n2 = 0-1023 0 0 is invalid. 15 1023 is invalid. Logical Terminal Identifier (LTID) and static Terminal Endpoint Identifier (TEI) pair for D-channel packet data transmission. MTEI = the maximum number of these pairs. LTID = Logical Terminal Group (LTG) and Logical Terminal Number (LTN). LTG and LTN are entered as part of the DPN configuration. The TE I must match the one in the terminal. By entering all three here, the MISP is able to route data from the terminal to the DPN packet switch. Xmm = Deletes the LTID and TEI for the specified TEI.
MCAL	2-(16)-32	Maximum number of calls on a DSL at one time. This includes calls waiting and on hold. Warning is received if less than 8 is specified.
MTSP	1-(8)-16	Maximum number of TSPs allowed for a DSL
PGPN	0-15	Protocol group number The protocol group should be previously added as described in <i>Configuring a protocol group</i> .

Prompt	Response	Comment
PRID	1-6	Defines the protocol to be used on the DSL Selection of the protocol ID is terminal dependent The values for this prompt are: 1=ANSI 2=ETSI NET-3 3=DMS 4=INS NET64 5=Numeris 6 = NI-1 <i>Note:</i> A response of 6 allows the ISDN BRI Conference feature to be configured in the TSP of the DSL
PDCA	(1)-16	Pad table number PDCA is only prompted for lines when PRID is ETSI NET3, INS NET64 or Numeris
FDN	n...n	Flexible CFNA directory number Enter a 4-13 digit directory number.
EFD	n...n	Flexible external call CFNA directory number Enter a 4-13 digit directory number.
HUNT	n...n	Hunt directory number Enter a 4-13 digit directory number.
EHT	n...n	Hunt external call directory number Enter a 4-13 digit directory number
TGAR	(0)-31	Trunk group access restriction
NCOS	(0)-99	Network class of service

Prompt	Response	Comment
CLS		Class of service access restrictions. The values for this prompt are:
	(ICDD)	Internal Call Detail Recording Denied
	ICDA	Internal Call Detail Recording Allowed
	(MRD)	Message Restriction Denied
	MRA	Message Restriction Allowed
	(UDI)	Unrestricted DID
	RDI	Restricted DID
	(UNR)	Unrestricted) - Releases 18 - 21.
	(CTD)	Conditionally Toll Denied - Release 22 and later.
	CUN	Conditionally Unrestricted
	FR1	Fully Restricted class 1
	FR2	Fully Restricted class 2
	FRE	Fully Restricted
	SRE	Semi-Restricted
	TLD	Toll Denied
	ICDA	Internal Call Detail Recording allowed
	(ICDD)	(Internal Call Detail Recording denied)
	<cr>	Enter <cr> to select the defaults.
		More than one class of service can be entered by separating each entry with a space.

Configuring a TSP

A TSP is added to a DSL by specifying the DSL location and its transmission characteristics as well as the class of service features for the terminals connected to the DSL. If you wish to accept the default value, press the Enter key <cr>.

Note: This step is not required for packet data implementation.

LD 27 — Configuring a TSP

Prompt	Response	Comment
REQ	NEW	New TSP
TYPE	TSP	Assign a TSP to a DSL
DSL	cc dsl#	DSL location The values for this prompt are: cc (card)=1-20 dsl# (DSL location)=0-7
USID	0-15	Note: The DSL must have been configured using the <i>DSL configuration procedures</i> . User service identifier USID=0 the default TSP is assigned to non-initializing terminals.
MPHC	(YES) NO	The total number of TSPs defined for a DSL cannot exceed the maximum number as specified by the MTSP prompt in the <i>DSL configuration procedures</i> . A default TSP should be configured for non-initializing terminals. This is done by assigning USID=0 to the TSP. The MPH is not supported on Option 11. Respond with MPHC = NO.

Prompt	Response	Comment
SPID	aaa...a <cr> Xaaa...a	Service profile ID aaa...a = any combination of 1-20 alphanumeric characters. <cr> = Stops this prompt from being displayed again. A maximum of 8 valid SPIDs per TSP are allowed. Xaaa...a removes the specified SPID. <cr>=Stops this prompt from being displayed again. A maximum of 8 valid SPIDs per TSP are allowed. This prompt appears only if the user service identifier is 1-15. It will be repeated until <cr> is entered but only up to 8 SPIDs are allowed per DSL. The SPID defined must be entered in the initializing terminal to associate the terminal with a USID.
FEATID	aaa mmm nnn <cr> Xaaa	ID associated with feature aaa, as follows: A03 = 3-party Conference A06 = 6-party conference mmm = Feature Activation ID(1-127) nnn = Feature Indication ID (1-127) (optional; if not entered, the value entered for mmm is assumed) <cr> = Skip the FEATID entry Xaaa = Delete the feature. Feature Activation ID and Feature Indication ID are feature key number assignments configured at the terminal level. Recommended terminal assignments are: - for the M5317TDX: A06 15 - for the M5209TDcp: A06 9

Prompt	Response	Comment
DN	xxxx (0)-N <cr>	Directory number to be associated with the TSP xxxx = DN to be associated with the TSP. (0)-N = CLID entry, with N = CLID SIZE-1 (SIZE defined in LD 15). <cr>=Stops this prompt from being displayed again The directory number assigned cannot be shared by a non-BRI terminal. This prompt is repeated until <cr> is pressed. At least one and a maximum of 8 DNs can be assigned to a DSL. The directory number can be associated with multiple TSPs on a DSL but it cannot be associated with any other DSL.
CT	VCE DTA	This prompt defines the call type to be associated with the Directory Number. The values for this prompt are: VCE=Circuit switched voice DTA=Circuit switched data One or more call types can be entered by separating each entry with a space. Note: The call types entered must have been specified for the B1CT and B2CT prompts in the <i>DSL configuration procedures</i>.
MCAL	1-(4)-8	Maximum number of calls per DN at one time Defines the maximum number of calls allowed for a directory number. This total represents the sum of active calls, calls waiting, and calls on hold.
PRES	(YES),NO	Allows display of calling line identification to far end on outgoing calls. YES= allows this DN to be presented to the called party on outgoing calls NO= do not present this DN to the called party on outgoing calls
COLP	(NO) YES	Connected Number Information Elements (IEs) is (not) passed from the Meridian 1 to the Terminal Adapter (S₀).
TRANS	(NO) YES	CLID and Connected Number Information Element (IE) are (not) passed from the Meridian 1 to the Terminal Adapter (S₀), if presentation is restricted.

Prompt	Response	Comment
FEAT	HTA/(HTD) FNA/(FND) SFA/(SFD) CFTA/(CFTD) MWA/(MWD) FBA/(FBD) HBTA/(HBTD) DNO1/DNO2/(DNO3) DNDN/(DNDY)	Class of service features HTA = Hunt allowed (always assign if terminal has CWT capability) HTD = Hunt denied FNA = Call forward no answer allowed FND = Call forward no answer denied SFA = Second level call forward no answer allowed SFD = Second level call forward no answer denied CFTA = Call forward by call type allowed CFTD = Call forward by call type denied MWA = Message waiting allowed MWD = Message waiting denied FBA = Call forward busy allowed FBD = Call forward busy denied HBTA = Hunting by call type allowed HBTD = Hunting by call type denied DNO1/DNO2/(DNO3) = QSIG Call Diversion Notification for calling party where: DNO1 = no notification DNO2 = notification without forwarded-to (diverted) party's number and name (DNO3) = notification with forwarded-to (diverted) party's number and name when available (default). DNDN/(DNDY) = QSIG Call Diversion Notification for forwarded-to (diverted) party where: DNDN = no notification of called party's number and name notification (DNDY) = notification with called party's number and name when available (default). You can enter more than one class of service by separating each entry with a space. You can press <cr> and select multiple default features shown in parenthesis.

Prompt	Response	Comment
DN	xxxx (0)-N <cr>	xxxx = DN to be associated with the TSP. (0)-N = CLID entry, with N = CLID SIZE-1 (SIZE defined in LD 15). <cr>=Stops this prompt from being displayed again The directory number assigned cannot be shared by a non-BRI terminal. This prompt is repeated until <cr> is pressed. At least one and a maximum of 8 DNs can be assigned to a DSL. The directory number can be associated with multiple TSPs on a DSL but it cannot be associated with any other DSL.
DFDN	n...n	Default directory number Enter a 1 to 7-digit directory number. This directory number must have been previously defined at the prompt DN above. A directory number can be associated with multiple TSPs. Only one default DN can be defined for a TSP. This DN is sent in the outgoing setup if the terminal does not send a calling line identification number with the outgoing call.

Configuring ISDN PRI trunk assignments for packet data

Note: This step is required for packet data implementation only.

The following describes how to configure ISDN PRI trunk assignments for packet data using LD 15, LD 17, LD 16 and LD 14 respectively.

LD 15 — Prompt formats for defining an ISDN customer

Prompt	Response	Comment
REQ	NEW/CHG	NEW for new customer or CHG for an existing customer
TYPE	CDB NET_DATA	Customer data block Networking Data (Release 21 gate opener).
CUST	0-31	Customer number.
...	...	
...	...	
ISDN	YES	YES customer is equipped with ISDN (only prompted with D-channel defined in overlay 17)
...	...	

LD 17 — Prompt formats for defining configuration data block

Prompt	Response	Comment
REQ	CHG	CHG to define data
TYPE	CFN	Configuration data block.
...	...	
CEQU	YES	CE parameter change
DLOP	1-9	1.5 Mb PRI
or PRI2	1-9	2.0 Mb PRI
...	...	

LD 16 — Configuring ISDN BRI trunk route parameters

Prompt	Response	Comment
REQ	NEW	Add ISDN BRI protocol group settings
TYPE	RDB	Route data block.
CUST	0-31	Customer number.
DMOD	<cr>	Default model number for this route
ROUT	0-511	Route number.
TKPT	TIE	Trunk route type.
ESN	<cr>	Pad control
CNVT	<cr>	Conventional switch route
SAT	<cr>	Satellite transmission
RCLS	<cr>	Class marked route
DTRK	YES	Digital Trunk Route
BRIP	YES	BRI packet handler route
DGTP	PRI or PRI2	1.5 Mb PRI 2.0 Mb PRI
PTYP	<cr>	Port type
ACOD	xxxxxxx	Trunk route access code
TARG	<cr>	Access restriction group number

Prompt	Response	Comment
CNTL	<cr>	Changes to control timers
...	...	

LD 14 — Configuring the trunk data

Prompt	Response	Comment
REQ	NEW	Enter new trunk data
TYPE	TIE	Trunk type
TN	cc uu	Card and unit
CUST	0-31	Customer number
NCOS	<cr>	Network class of service group
RTMB	xx xx	Route and route member
MNDN	<cr>	Manual directory number
TGAR	<cr>	Trunk group access restriction
CLS	<cr>	Class of service
TKID	<cr>	Trunk identifier
...	...	